CHEMICAL HYGIENE PLAN FOR LABORATORIES

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Prepared:

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TERMS AND DEFINITIONS

Action Level
A concentration designated in 29 CFR 1910, Subpart Z for a specific substance. This value is calculated as an 8-hour, time-weighted average and initiates certain required activities (e.g., exposure monitoring and medical surveillance).

Acute Toxicity
The toxic effect of a substance that has a rapid onset, sharp or severe effects, and pronounced symptoms; this effect is not chronic.

American Conference of Governmental Industrial Hygienists (ACGIH)
An independent professional organization that prepares an annual list of recommended exposure guidelines for hazardous chemicals in the occupation setting. See "threshold limit value".

Chemical Emergency
An incident involving chemicals becomes an emergency whenever there is injury of personnel, an unplanned release to the environment, an explosion, or an unplanned or uncontrolled fire.

Chemical Hygiene Plan
A written program developed and implemented by the employer that sets forth procedures, equipment, personal protective equipment, and work practices to (1) protect individuals from the health hazards caused by hazardous chemicals used in a particular workplace, and (2) meet the requirements of paragraph (e) of 29 CFR 1910.1450.

Chronic Toxicity
The toxic effect of a substance that develops gradually, lasts for a long time, and may have a delayed onset after exposure; this effect is not acute.

Combustible Liquid
Any liquid having a flash point at or above 100ºF (37.8ºC) but below 200ºF (93.3ºC), except for mixtures having components with flash points of 200ºF (93.3ºC) or higher, the total volume of which makes up 99% or more of the total of the mixture.

Compressed Gas
1. A gas or mixture of gases in a container that has an absolute pressure exceeding 40 psi at 70ºF (21.1ºC).
2. A gas or mixture of gases in a container that has an absolute pressure exceeding 104 psi at 130ºF (54.4ºC) regardless of the pressure at 70ºF (21.1ºC).
3. A liquid having a vapor pressure that exceeds 40 psi at 100ºF (37.8ºC), as determined by ASTM D-323-72.

Designated Area
An area that may be used for work with "select carcinogens," reproductive toxins, or substances that have a high degree of acute toxicity. A designated area may be an entire laboratory, an area of a laboratory, or a device (e.g., a laboratory hood).

Designated Carcinogen
A carcinogen that meets the criteria for OSHA "select carcinogen" or falls into Category 1 or 2 of the ACGIH's list of carcinogens.

Explosive
A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

Flammable Chemical
A chemical that falls into one of the following categories:

1. *Aerosol, Flammable* – an aerosol that, when tested by the method described in 18 CFR 1500.45, yields a flammable projection that exceeds 18 inches at the full valve opening or a flashback (a flame extending back to the valve) at any degree of the valve opening.

2. *Gas, Flammable* – (a) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13% or less by volume. (b) A gas that, at ambient temperatures and pressure, forms a range of flammable mixtures with air that is more than 12% of volume regardless of the lower limit.

3. *Liquid, Flammable* – Any liquid having a flash point below 100ºF (37.8ºC), except for mixtures having components with flash points of 100ºF (37.8ºC) or higher, the total of which makes up 99% or more of the total volume of the mixture.

4. *Solid, Flammable* – A solid, other than a blasting agent or explosive (as defined by 29CFR 1910.109[a]), that may cause fire through friction, absorption change, or retained heat from manufacturing or processing, or that can be ignited readily and when ignited burns vigorously and persistently thereby creating a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites sand burns with a self-sustained flame at a rate greater than 0.1 inches per second along its major axis.

Hazardous Chemical
A chemical for which there is statistically significant evidence (based on at least one study conducted in accordance with established scientific principles) that acute or chronic health effects may occur if individuals are exposed. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic systems, or agents that damage the lungs, skin, eyes, or mucous membranes.

High Acute Toxicity
Substances with the following effects (from 29 CFR 1910.1200):

1. Median LD50 of 50 mg/kg orally in albino rats, total dosage 200-300g.
2. Median LD50 of 200 mg/kg by continuous contact for 24 hours with the bare skin of albino rabbits weighing between 2 and 3 kg.
3. Median LC50 in air of 200 ppm (or mg/L) continuous inhalation for 1 hour.

Laboratory
A facility where the "laboratory scale use of hazardous chemicals" occurs or a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory Scale
Work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safety manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

Laboratory Use of Hazardous Chemicals
The handling or use of such chemicals where all of the following conditions are met:

1. Chemical manipulations are carried out on a laboratory scales.
2. Multiple procedures or chemicals are used.
3. The procedures involved are neither part of a production process, nor in any way simulate one.
4. "Protective laboratory practices and equipment" are available and are commonly used to minimize the potential for exposure to hazardous chemicals.

LC50
"Lethal concentration, 50% is the statistical calculation of the airborne level of a substance that, if inhaled, is fatal to 50% of the test organisms. This concentration is usually expressed in units of mass over volume (e.g., mg/m^3) or in parts per million (ppm). Species and exposure conditions must be specified.

LD50
"Lethal dose, 50%" is that statistical calculation of the amount of a substance that is fatal to 50% of the test organisms. This value is usually expressed in units of mass per body weight of the tested species (e.g., mg/kg). Exposure route, species, and duration of exposure conditions must be specified.

Organic Peroxide
An organic compound that contains the bivalent –0-0- structure. Such a compound may be considered as a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical.

Oxidizer
A chemical, other than a blasting agent or explosive (as defined in 29 CFR 1910.109[a]), that initiates or promotes combustion in other materials, thereby causing fire of itself or through the release of oxygen or other gases.

Particularly Hazardous Substances
For the purpose of this supplement, these include OSHA "select carcinogens," reproductive toxins, and substances with a high degree of acute toxicity.

Permissible Exposure Level (PEL)
The OSHA exposure limits for hazardous chemicals in the workplace. These limits are contained in 29 CFR 1910, Subpart Z.

Physical Hazard
A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, an explosive, a flammable, organic peroxide, an oxidizer, a pyrophoric, an unstable (reactive), or a water reactive.

Protective Laboratory Practices and Equipment
Laboratory procedures, practices, and equipment accepted by laboratory health and safety experts as effective, or those that employees/students can show to be effective in minimizing the potential for exposure to hazardous chemicals.

Reproductive Toxins
Chemicals that affect reproductive capabilities, including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

Select Carcinogen
Any substance that is:

1. Regulated by OSHA as a carcinogen.

2. Listed under the category "known to be carcinogens" in the National Toxicology Program's (NTP's) *Annual Report on Carcinogens*.

3. Listed under Group 1 (carcinogenic to humans) by the *International Agency for Research on Cancer (IARC) Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man.*

4. Listed in either Group 2A or 2B by IARC or under the category "reasonably anticipated to be carcinogens" by NTP. Such a substance causes statistically significant tumor incidence in experimental animals based on any of the following criteria:

    a. After oral dosages of less than 50 mg/kg of body weight per day.

b. After inhalation of 6-7 hours per day, 5 days per week, for a significant part of a lifetime of levels less than 10 mg/m3.

c. After repeated skin application of less than 300 mg/kg of body weight per week.

Threshold Limit Value (TLV)
Airborne concentrations of substances to which it is believed that nearly all laboratory workers may be repeatedly exposed, day after day, without adverse health effects.

Unstable (Reactive)
A chemical that, in its pure state or as produced and transported, will vigorously polymerize, decompose, condense, or become self-reactive under conditions of shock, pressure, or temperature.

Water Reactive
A chemical that reacts with water to release a gas that is flammable or a health hazard.

3.0

COMPLIANCE INSPECTION PLAN REVIEW PAGE

In accordance with the Occupational Safety and Health Administration (OSHA) Regulation "Occupational Exposure to Hazardous Chemicals" codified as 29 CFR1910.1450 (e)(4) a review and evaluation of this Chemical Hygiene Plan (CHP) is conducted at least annually to ensure the effectiveness of the plan. As a result of this review and evaluation, the college will amend the CHP within one month of the review to include more effective procedures and controls if the plan proves to be ineffective in: (1) protecting students, faculty, and staff from health hazards associated with hazardous chemicals in the laboratory, and (2) keeping exposures below the regulatory limits specified in 29 CFR 1910, Subpart Z.

Review Date	Plan Update Required (yes/no)	Brief Description of Required Revisions (if necessary)	Signature Certifying to Statement Below	Date of Amendment (if necessary)
12/1/2012	Yes	Contact information	T. Seth Vance	1/3/2012

Certification Statement:
"I have completed a review and evaluation of the CHP for Temple College and will/will not amend the Plan as a result."

3.0

CHEMICAL HYGIENE PLAN LOCATIONS

Per OSHA Regulation 29 CFR 1910.1450 (e)(2), this Chemical Hygiene Plan (CHP), shall be readily available to employees/students, faculty, and staff of Temple College (Temple) as well as to the regulatory agencies, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designated representative upon request.

Additional documentation and references made available at the campus include:

- The current edition of the Temple "Emergency Management Procedure";
- A copy of the "Occupational Exposure to Hazardous Chemical" standard. (Also referred to as the OSHA Laboratory Standard.);
- The chemical inventories for the laboratories at Temple and off campus teaching sites;
- Copies of Material Safety Data Sheets (MSDS's) for chemicals used in laboratories at Temple;
- Additional reference materials relating to laboratory safety and the use of hazardous materials; and
- The current edition of the Temple "Waste Management Plan".

In order to ensure that the plan is readily available, a copy of the plan will be maintained in the Chemical Safety Officer's Office, within the Marc. A. Nigliazzo Administration Building Room 903, the Physical Plant Building Room 1203, Campus Development Office-Watson Technical Center Room 570 and on the Temple College website.

In case of an emergency when the Chemical Safety Officer is not immediately available, contact Campus Safety (254) 298-8291 to gain access to the documentation as referenced above.

In all other cases, viewing of the documentation and references must be arranged through:

Mr. Seth Vance
Environmental, Health and Safety

Email: seth.vance@temple.jc.edu
Office: 825 Arnold Student Union
Telephone: (254) 298-8593

As revisions to the CHP are made, the copy stored at the above location will be updated.

3.0

1.0 INTRODUCTION

Temple has developed this Chemical Hygiene Plan (CHP) to meet the following objectives:

- Educate and protect students, faculty and staff from health concerns associated with the use of hazardous laboratory chemicals.
- Assure that chemical exposures are not in excess of the permissible exposure limit adopted by OSHA.
- Protect college visitors and property against potentially dangerous accidents associated with the handling, storage and disposal of hazardous chemicals.

The CHP follows the general format and content of the Model Chemical Hygiene Plan provided by the Laboratory Safety Institute and modified as appropriate to reflect the current practices at Temple.

This CHP also satisfies the requirements of the U.S. Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1910.1450, *Occupational Exposures to Hazardous Chemicals in Laboratories* and commonly referred to as the "Laboratory Standard" (Available in Appendix J). Although some of the policies and practices described in this CHP may not be part of the OSHA Laboratory Standard, they have been deemed by Temple as appropriate for maintaining a safe environment for students, faculty and staff.

Background

Before 1990, OSHA's approach to controlling occupational exposure to hazardous chemicals was to develop lists of permissible exposure limits (PELs), substance-specific standards, and the health hazard communication standard (29 CFR 1910.1200 and 29 CFR 1910.1200 Appendices A, B, C, D, and E). These regulations address industrial applications where workers typically received prolonged exposure to large quantities of a few chemicals. The OSHA Laboratory Standard (enacted in 1991) applies to all employees engaged in the use of hazardous chemicals in laboratory workplaces where short-term exposure to varying amounts of such chemicals may be encountered. This standard emphasizes worker training and safe work practices.

Applicability

The OSHA Laboratory Standard only applies to laboratory workplaces where chemicals are used in a non-routine, non-production manner by workers with at least some education and training in science. Examples of where this standard applies at Temple are biology, chemistry, and environmental science laboratories. *Not* covered by this standard include photo labs that do not change chemical processes, electronics labs, machine shops, craft shops, and pilot plant operations that are or simulate a production operation in which chemicals will not change.

3.0

Laboratory use of hazardous chemicals is defined as the handling or use of hazardous chemicals in which all of the following criteria are met:

1. Procedures using chemicals are carried out on a laboratory scale (e.g., using containers for reactions, transfers, and other handling of chemicals that are easily manipulated by one person).

2. Multiple chemical procedures or chemicals are used.

3. The operations involved are neither part of a production process nor simulate one.

4. Protective laboratory practices and equipment are available and are commonly used to minimize the potential for employee exposure to hazardous chemicals.

When the operations in a particular laboratory meet all of the above criteria, that laboratory must comply with the requirements of this Chemical Hygiene Plan. Operations in laboratories involved in the use of hazardous chemicals that do not meet the criteria previously outlined shall comply with Temple's Emergency Plan, including all other applicable OSHA regulations.

Temple's laboratories also generate chemical wastes that may pose environmental, as well as human hazards. These wastes are considered hazardous and are regulated by Federal EPA, state, and local laws and regulations. The most important of these laws and regulations that apply to Temple's laboratories are:

- The Federal Resource Conservation and Recovery Act (RCRA - Title 40 of the Code of Federal Regulations (40CFR) Parts 260-272).

- The State of Texas Administrative Code for Industrial Solid Waste and Municipal Hazardous Waste Regulations (Chapter 335).

- The City of Temple Ordinance Chapter 38 "Water, Sewage, and Sewage Disposal" defines what types of wastes that can be poured down sink drains and into the public sewer system.

Temple has developed a separate Waste Management Plan (WMP) to ensure compliance with these rules and regulations. The WMP is also available from the Chemical Safety Officer.

3.0

2.0 GENERAL PRINCIPLES

The following principles and elements have been adapted for Temple from the American Chemical Society Model Chemical Hygiene Plan.

1. The CHP provides specific laboratory practices and Standard Operating Procedures (SOP's) to minimize the exposure of faculty, students and staff to hazardous substances. Following the practices and SOP's specified in the CHP will minimize health and safety risks.

2. It is prudent to minimize all chemical exposures because most laboratory chemicals present hazards of one type or another. Control measures to be implemented include engineering controls, the use of personal protective equipment, and hygiene practices. Employees and students will follow general precautions for handling all laboratory chemicals. Specific guidelines for some chemicals that are known to be extremely hazardous, such as those found in the appropriate Material Safety Data Sheets (MSDS), will also be followed.

3. The decision to use a particular hazardous substance within a laboratory will be based on the best available knowledge of each chemical's particular hazard and the availability of proper handling facilities and equipment. The circumstances of which will require prior approval from the pertinent department chair, with consultation of administration where necessary, before it can be implemented. Substitutions, either of chemicals, demonstrations, or experiments, will be made where appropriate to reduce hazards without sacrificing instructional objectives.

4. The permissible exposure limit (PEL) and threshold limit value (TLV) of a typical chemical used in the laboratory are available on the MSDS for that chemical. Employee and student exposure to hazardous chemicals should not exceed these limits, and by following the procedures and guidelines within this CHP, exposure will be kept below these limits identified by the American Conference of Governmental Industrial Hygienists (ACGIH).

5. The best way to prevent exposure to airborne substances is to prevent their escape into the laboratory by using hoods, ventilation devices, and other protective equipment. These devices must be kept in good working order to provide employees with a safe working area with specific measures taken to ensure proper and adequate performance of such equipment.

6. The institution should not accept a chemical from a supplier unless it is accompanied by the corresponding MSDS. All MSDS should be accessible to employees at all times, and pertinent employees should be trained to read and use the information provided on the MSDS.

7. Departmental provisions have been established for employees/students to receive appropriate safety information and required training, as well as consultants and medical examinations, if necessary.

8. Designation of the personnel responsible for implementing the chemical hygiene plan, including assignment of a chemical safety officer. The establishment of a chemical safety committee is recommended, but not mandatory.

9. Departmental provisions have been established for additional protection for employees/students who work with "particularly hazardous substances." These include select carcinogens, reproductive toxins, and substances that have a high degree of acute toxicity.

3.0 FACULTY, STAFF AND STUDENT RESPONSIBILITIES

Everyone who teaches, studies or works in a Temple laboratory is responsible for being aware, understanding and following the CHP. The most visible person responsible for the CHP is the Chemical Safety Officer (CSO). A description of this position and others who share in conveying to the CSO the authority to take the steps necessary to ensure that the CHP is protective are discussed below.

3.1 VP of Administration Services

Temple's VP of Administration Services (VPAS) has the ultimate responsibility for chemical hygiene at Temple and provides, along with other officers and department chairs, support for efforts to improve chemical safety and health. The VPAS supervises and authorizes the CSO to take steps necessary to carry out the objectives of the CHP including the following:

1. Approving the Chemical Hygiene Plan (CHP) for laboratories at Temple.

2. Monitoring the implementation of the CHP at all applicable levels of administration within Temple.

3. Reviewing and adopting any proposed changes to the CHP.

4. Obtaining any required licensing, permits, or approval from local, state, and federal agencies to purchase, store, use, synthesize, administer, and/or dispose of any hazardous material, prescribed medication, or controlled substance.

3.2 Chemical Safety Officer

The VPAS at Temple appoints a CSO for the Departments of Biology, Chemistry, Physics, and Biomedical Science, as well as other pertinent departments at Temple College. The CSO coordinates all health and safety activities and monitors CHP practices. Located within Appendix A is the memorandum of designation for the CSO for the institution. Duties include but are not limited to:

1. Determining which part of Temple operations is governed by the OSHA Laboratory Standard, and ensuring that such operations comply with the Chemical Hygiene Plan.

2. Working with the appropriate personnel to evaluate, implement, and update the CHP on a routine basis. Monitors the Environmental Health & Safety (EH&S) activities within each of the departments listed above.

3. Providing administrative support to the faculty and staff and direct inquiries to appropriate resources.

4. Ensuring that extremely hazardous substances (EHS) are appropriately labeled, handled, stored, and managed and that specific standard operating procedures are developed and maintained with instructions for all personnel in the safe use, cleanup and disposal of these substances.

5. Conducting, or designating the conduction of, semiannual inspections of labs and storage areas and provide a written report and recommendations for follow-up activities, as needed. (Inspection Form provided in Appendix B).

6. Coordinating the operation, acquisition, and maintenance of fume hoods, emergency safety showers, eyewashes, and fire extinguishers where chemicals are handled.

7. Monitors reports of significant lab incidents, chemical spills, and significant near- misses to prevent repeat occurrences.

8. Acting as a liaison between laboratory operations and the VPAS's office. Bring unresolved and potentially serious health and safety problems to the VPAS's attention.

9. Maintaining records and making them available to employees and administrative personnel.

10. Completing or designating the task of completing (upon department chair approval), an annual computerized inventory of all chemicals in storage rooms. (See Appendix C), and aiding in the identification of expired and unusable chemicals stored for disposal.

11. Maintaining a collection of references on laboratory safety and hazardous materials including current MSDS for all chemicals.

12. Monitoring the procurement, use and disposal of laboratory chemicals.

13. Developing an appropriate implementation program for chemical hygiene, including procedures for complying with each element of the CHP, such as training, information exchange, and record keeping.

14. Training of all lab employees and other personnel who may come into contact with hazardous chemicals.

15. Coordinating waste pickups with those responsible for waste disposal on campus.

16. Familiarizing oneself with the Waste Management Plan maintained under separate cover.

3.3 Faculty and Staff

Faculty and staff, who have the responsibility of Environmental Health & Safety of a laboratory during the instruction of students at Temple, participate in the implementation of this CHP and overall safe lab practice by:

1. Informing and training students and workers on chemical and operational procedure safety as it applies to activities in their areas.

2. Providing students with a copy of the Temple Laboratory Safety Rules and request completion and return of the signed Signature Page at the start of each semester. (See Appendix I)

3. Understanding planned experimental activities and the hazardous chemicals involved, including special personal protective equipment that may be required for those activities.

4. Implementing and enforcing rules and standards concerning health and safety for laboratory, classroom and support facilities.

5. Ensuring student and lab worker compliance with the CHP.

6. Being aware of hazardous properties of chemicals stored and used in the area, and if possible evaluating and limiting an experiment's potential for environmental emissions;

7. Before each lesson, teaching students about hazardous substances used in the lab experiment and ensuring that each student is aware of potential dangers (i.e. identifying safety concerns and developing safety procedures for each experiment).

8. Ensuring that proper protective equipment is available and is in working order, and that individuals in the laboratory have been trained in the proper use of such equipment.

9. Ensuring that all containers of hazardous waste are properly labeled and stored according to the Waste Management Plan.

10. Ensuring that all chemical labels are not defaced or removed.

11. Notifying the CSO and making an incident report immediately if a significant spill or any injury occurs. (Incident Report available in Appendix D)

12. Providing assistance, if needed, to the CSO.

3.4 Student and Lab Workers

Students and lab workers participate in the implementation of this CHP and overall safe lab practices by:

1. Indicating by signature that they have been notified of the location(s) of the CHP and understand all safety instructions and are willing to abide by them (Appendix I).

2. Following all health and safety standards, SOP's and rules established in the CHP as communicated by staff and faculty.

3. Reporting all hazardous conditions to the supervising faculty or staff.

4. Wearing and using prescribed personal protective equipment.

5. Reporting any illness or job-related injuries to the supervising faculty or staff. (See Appendix D)

6. Requesting information and training if not sure about proper operational procedures.

7. Monitoring the workplace to identify EH&S concerns.

4.0 STANDARD OPERATING PROCEDURES

Staff and students must follow the CHP to minimize their risk since most laboratory chemicals present some form of potential hazard to human health, the environment and campus safety. Generally, textbooks, laboratory manuals, and other instructional materials designate the safety precautions needed for a particular laboratory activity. However, total reliance on such publications to provide complete and accurate information is not advisable. Employees should consult additional references, including MSDS, before undertaking an unfamiliar activity.

4.1 Safety Equipment and Procedures

Temple shall provide appropriate laboratory safety equipment, such as eyewash stations, emergency showers, fire blankets, fire extinguishers, first aid kits, fume hoods, gloves, respirators, chemical resistant aprons, and face shields. Temple shall provide employees with their own eye protection (e.g., chemical splash goggles or safety glasses). Temple College provides students with safety glasses which are washed and sanitized between semesters. Eye protection should meet the American National Standards Institute (ANSI) Z87.1 requirements.

Safety procedures shall be developed to satisfy parts of this Chemical Hygiene Plan, and their content must be consistent with this document. In particular, the following section will be the primary documentation for how laboratories shall implement the CHP.

4.2 Laboratory

General laboratory SOP's include the following:

1. Never place food or beverage in storage areas, refrigerators, glassware, or utensils that are also used for lab operations.

2. Do not eat, drink, smoke, chew gum, manipulate contact lenses or apply cosmetics in labs where chemicals or other hazardous materials are present.

3. Minimize exposure to all chemicals regardless of their familiarity.

4. Minimize the presence of unknown materials. Treat unidentifiable materials as hazardous waste.

5. Immediately wash areas of exposed skin that has come into contact with chemicals.

6. Confine long hair and loose clothing. Wear closed-toed shoes in the lab.

7. Wear appropriate eye protection at all times.

8. When deemed pertinent by the department, wear long-sleeved. Always wear long-legged clothing. While performing certain lab work, never wear short-sleeved T-shirts, short skirts, or shorts. Jewelry should not be worn that interferes with gloves, and other protective clothing or that could come into contact with electrical sources or react with chemicals. If short sleeves are worn, a lab coat with long sleeves can be worn to cover the exposed arms.

9. Conduct yourself in a responsible manner at all times in the laboratory. This means that horseplay, throwing items, and pranks are prohibited.

10. No one should work alone in the lab or chemical storage area unless persons in authority are in the vicinity and are aware that someone is in the laboratory. An exception may be lab coordinators who are performing routine lab preparations.

11. "Wafting" to test chemical odors should only be done with extreme caution and when only specifically directed to do so in the written experimental procedure. Also, chemicals should never be tasted.

12. Never use your mouth to draw fluid through a pipette. Always use a bulb or other device for suction.

13. Consultation of a physician is recommended if you might be pregnant, or have any medical condition that could render you particularly susceptible to chemical exposure.

14. Do not force glass tubing into rubber stoppers. Lubricate the glass and hold the tubing and stopper with cloth towels as the tubing is inserted into the stopper.

15. Proper Bunsen burner procedures shall be followed. Never leave a flame unattended.

16. Should a fire drill or any other evacuation occur during a lab activity, turn off all Bunsen burners and non-essential electrical equipment. Leave the room as directed.

17. Hot glass looks like cold glass and remains hot for a long time. Determine if an object is hot by bringing your hand close to the object but do not touch the object.

18. In the event of glassware breakage, protection for the hands should be worn when picking up the broken pieces. Small pieces should be swept up with a brush and pan.

19. Minimize the quantities of flammable liquids available in a laboratory to that needed for the experiment.

20. Ensure that sources of ignition are not close or nearby when working with flammable materials.

21. Use a tip-resistant shield for protection when working with chemicals that may explode or implode.

22. Students must read lab directions ahead of time and follow all verbal and written instructions.

23. Students shall perform only authorized experiments.

24. Students shall report all accidents, including spills, or injuries to the instructor at once, no matter how trivial it may seem. Depending of the severity of the accident, the instructor may call 911 or recommend that the student gets medical attention immediately. The first aid kit is available for minor injury.

25. Students shall work in a laboratory or chemical storage area only under the direct supervision of a science teacher or laboratory supervisor.

26. Students should dispose of hazardous waste and empty containers in accordance with the Waste Management Plan.

27. Students should ask for assistance from faculty or staff whenever one is unsure regarding the safe handling or disposal of chemicals and waste.

4.3 Housekeeping Practices

General housekeeping practices to be followed in the laboratories and stock rooms including the following:

1. Keep all work areas clean, dry and uncluttered. Students should wipe down their bench top areas at the end of each lab period. All bench top areas should be thoroughly wiped down between semesters.

2. Access to emergency equipment, utility controls, showers, eyewash stations, and lab exits should never be blocked.

3. Sinks are to be used only for disposal of water and those solutions designated by the instructor. All other wastes must be deposited in the appropriate, segregated and labeled receptacles and follow the disposal procedures outlined in the Waste Management Plan.

4. Minimize the release of toxic vapors into the lab by using fume hoods.

5. Clean up all chemical spills as soon as they occur. Chemicals and cleanup materials should be disposed of correctly.

6. Store chemicals and equipment properly. Chemicals should not be stored in aisles, on the floor, in stairwells, on desks, or laboratory tables.

7. Before leaving the laboratory for the day, ensure the student bench top services (gas, electricity, water) are completely turned off.

8. Keep all cabinets and drawers closed when not in use to avoid catching and bumping hazards.

9. Bring only your lab instructions, calculators, and writing instruments to the bench top. Leave backpacks and other belongings in the student cubby area of the laboratory.

4.4 Chemical Procurement and Purchasing

General chemical procurement and purchasing procedures consist of the following:

1. The Physical Plant Department receives, inventories, and distributes bulk chemicals to individual labs. All other chemical shipments are received in the mail room and distributed to the appropriate department or directly received by the department.

2. All laboratory chemical purchases will be made through the Temple College purchasing after requisition by the department.

3. Donated chemicals should not be accepted unless prior permission is received from the department chair with notification to the CSO.

4. When purchasing chemical supplies for labs, a copy of all chemical purchase order requests should be sent to the CSO upon request.

5. Efforts must be made to purchase chemicals in small-sized containers. The lesser unit cost for bulk purchases are outweighed by the cost of additional storage and disposal of old, unused materials.

6. Check chemical purchases against inventory to reduce duplicate purchases and stock build-up.

7. Before an extremely hazardous chemical is ordered, such as carcinogens, reproductive hazards, and acutely toxic substances, consideration must be given to the adequacy of facilities and equipment to safely handle its type and quantity. Consideration must also be given to whether a less hazardous material may be substituted.

8. All purchase orders must include a request that MSDS be sent to the appropriate department. It will be up to each department to determine how best to distribute MSDS so employees have access to them during working hours.

4.5 Chemical Inventory

An inventory of hazardous and potential hazardous laboratory chemicals must be completed for all Temple College laboratories on-campus as well as off-campus sites. Its focus is on the chemical stock rooms where bulk chemicals are stored. It should also include each individual laboratory where chemicals are stored while in use during the academic year. The inventory is to be updated annually and expanded to include the following information:

- Chemical name and Chemical Abstract Service (CAS) registry number;
- Chemical supplier;
- Department, Building, and Room number (if appropriate);
- Hazardous constituents with chemical (or chemical itself);
- Is the chemical an Extremely Hazardous Substance (yes/no);
- Does the Extremely Hazardous Substance exceed its threshold planning quantity (TPQ) or 500 lbs, whichever is less;
- Date received;
- Expiration date (if applicable);
- Quantity on hand;
- Physical condition and integrity of the container when inventoried (optional); and
- An indication of whether the chemical should be disposed.

Chemicals whose storage limits have expired and are unfit for use, or containers or labels are in poor condition or missing to where the contents are compromised or unknown must be marked for disposal and placed in the inventory until their ultimate disposal. Appendix C contains a template to use for chemical inventory.

4.6 Chemical Receiving

General chemical receiving procedures include the following:

1. All incoming shipments must be inspected by the CSO, lab coordinator or department personnel and should be refused if proper labels are not attached, or containers are not intact and not in good condition.

2. If leaking containers are found, the containers must immediately be placed in an appropriate secondary container.

3. Chemicals should arrive with expiration dates assigned.

4. Where necessary, all areas where shipments of chemicals are received will have appropriate personal protective equipment (PPE) and spill-control materials available. Each chemical receiving area should have an appropriate fire extinguisher. There should be a safety shower and eyewash station within the area.

5. Labels on incoming containers shall not be removed or defaced. For secondary containers, Temple must ensure that the following information is displayed: Name of the hazardous chemical and information pertaining to the hazard (i.e. flammable, corrosive, toxic, etc.).

4.7 Chemical Storage and Distribution

The primary storage concerns with all chemical materials are to minimize the amounts stored, to avoid contact between incompatible chemicals, and to ensure that hazardous storage conditions (e.g., light and heat) are not present. Specific storage procedures, however, will depend on the type of storage equipment available and the chemicals in use. Some standard storage practices are described below.

1. All chemicals should be in tightly closed, sturdy, and appropriate containers. Periodically check the container, label integrity, and the shelf life of chemicals in storage. If deficient, these containers shall be correctly labeled before removing from storage areas.

2. If the chemical has been transferred to a secondary container, the new container should be appropriately labeled, including all of the hazard information. (See Appendix E for Secondary Labeling Template)

3. Do not store incompatible materials in the same cabinet. Corrosives, flammables, oxidizers, and poisons are mutually exclusive categories.

When a substance has multiple hazards, preference shall be given to the most acute or reactive property. Chemicals should be stored based on the reactive nature and compatibility group of the chemical. (Refer to Chemical Compatibility Chart Appendix F)

4. Large containers and containers with reactive chemicals, such as acids and bases, should be on low shelves.

5. The classification system used for the storage of chemicals should be displayed in the principal storage area.

6. Do not overload storage cabinets according to the manufacturers recommended storage limits.

7. Flammable chemicals shall be stored in approved storage containers and in approved flammable chemical storage cabinets.

8. Combustible packaging material (i.e. cardboard) should not be stored inside flammable chemical storage cabinets.

9. All storage areas should be securely locked when not in use. Storage and preparation areas should be accessible only to those persons authorized to use the chemicals.

10. Unless it is a manufacturer supplied container, glass bottles containing highly flammable liquids shall not exceed 500 mL. For larger volumes, metal or approved plastic may not exceed 1 gallon, and safety cans shall not exceed 2 gallons.

11. Refrigerators used to store flammable chemicals shall be labeled and shall be of explosion proof or of lab safe design. Household refrigerators are not to be used for flammable storage.

12. Do not store food intended for human consumption with hazardous materials in the same refrigerator. Label refrigerators used for chemical storage.

13. Hand-carried hazardous chemicals should be placed in an outside container or acid-carrying bucket to protect against breakage.

14. Wheeled carts used to transport chemicals should be stable and move smoothly over uneven surfaces without tipping or stopping suddenly, and should have lipped surfaces that would restrict the containers if the containers break. If lipped surface is not provided on the cart, chemicals should be placed in an outside container or acid carrying bucket to protect against breakage.

15. Purchase and store reasonable amounts of materials needed for future experiments.

16. Ventilate storage areas and individual storage cabinets as needed to limit exposure of individuals in the building.

17. Install and maintain smoke detectors in chemical storage areas.

18. Install and maintain automatic locks and self-closures on doors leading into chemical storage rooms.

19. Consider the technical requirements and implement seismic safety for chemical storage rooms, shelves, and cabinets.

4.8 Gas Cylinders

Compressed gases present a unique danger since individuals are exposed to both mechanical and chemical hazards. Hazards can arise from reactivity and toxicity of a gas, and asphyxiation can be caused by high concentrations of even "harmless" gases such as nitrogen. The large amount of potential energy resulting from compression of the gas makes a gas cylinder a potential rocket or fragmentation bomb. Therefore, the following procedures must be followed when handling compressed gases.

1. The contents of a gas cylinder should be clearly identified with decals, stencils, or appropriate tags. A cylinder lacking proper identification should not be accepted from a vendor.

2. The hazardous properties of each gas should be determined before the gas is put to use. The flammability, toxicity, chemical activity, and corrosive effects of the gas should be considered, and the user should take adequate safety precautions at all times.

3. Gas cylinders should not be dragged, rolled, or slid. A suitable handcart should be used for transporting large gas cylinders. The handcart should be equipped with a belt or chain for securing the cylinder.

4. Under no circumstances should any individual ride in a passenger elevator with a gas cylinder. The cylinder should be secured in the elevator and sent to the desired floor without any passengers. As a precaution, a sign should accompany the gas cylinder indicating that passengers should not enter the elevator.

5. Gas cylinders should only be moved from one location to another with the protective cap securely in place.

6. Both full and empty cylinders should only be stored where they may be securely restrained by straps, chains, or a suitable stand.

7. The protective valve cap should be kept on a cylinder at all times, except when the cylinder is connected to dispensing equipment.

8. Cylinders should be protected from abuses such as exposure to damp ground, direct sunlight, extreme temperature changes, precipitation, direct flames, electrical currents, corrosives, and physical damage.

9. Gas cylinders should only be used with the appropriate dispensing equipment. Do not force connections or use homemade adapters. Standards for design, installation, and maintenance of dispensing equipment are determined by the American National Standards Institute (ANSI).

10. The size of the individual gas cylinders and the total number of cylinder present in a laboratory should be limited to the amount needed for immediate use (e.g. a semester).

11. A cylinder should be considered empty when there is still a slight positive pressure.

12. An empty cylinder should be returned to the supplier as soon as possible after having been emptied or when it is no longer needed.

13. Cylinders should not be exposed to temperatures above 50 °C (122 °F).

14. Store flammable gases separately from oxidizer gases.

15. Compressed gas cylinders will only be transported to and from the campus by the supplier.

4.9 Waste Disposal

Temple shall ensure that the disposal of laboratory chemicals is in compliance with the procedures outlined in the Waste Management Plan available from the CSO. To protect the environment, safety, and health of individuals at Temple and in the surrounding community, hazardous waste must be disposed of properly. Therefore, all laboratory personnel who generate or handle hazardous, radioactive, or mixed waste should be adequately trained. The following disposal requirements must be enforced.

1. Do not pour hazardous or radioactive chemicals down a sanitary sewer or sink drain. Retention system drains may be used only when specifically approved for such chemicals.

2. Place wastes in properly designated and labeled containers for disposal. All hazardous waste must be removed from the campus regularly by a licensed hazardous waste disposal service.

3. Before leaving the laboratory, ensure that chemicals and wastes generated are properly labeled, properly closed, prepared for disposal, and/or assigned to someone who understands how to manage such materials.

4.10 Chemical Spills

Call Campus Security (254) 298-8291 if the following occurs:

- An accident or spill involving hazardous materials results in a serious injury.
- Hazardous material is released into the sewer system.
- The severity of an incident is unclear.

1. Under the following situations, the spill would be judged to present an immediate hazard, evacuation is to be absolute, and the area should be isolated until a HAZMAT team arrives:

   - If hazardous vapors are present, the area should be isolated. Only persons trained in the use of respirators may enter the area. This will frequently mean waiting for the arrival of a HAZMAT team.
   - Hazardous material cannot be safely neutralized or contained by the personnel on hand.
   - A fire is involved with any chemical spill or accident.
   - Individuals are unfamiliar with the hazards of the spilled material.

2. If a large amount of a volatile, flammable material is spilled, immediately extinguish flames, turn off all electrical apparatus, and evacuate the area. Consult the MSDS for appropriate cleanup procedures. If the quantity exceeds the employee's ability or training to handle the spill, seal the area until appropriately trained personnel arrive.

3. If there is no immediate danger (flammability, toxicity, reactivity, corrosivity) to personnel, containment should be accomplished by use of spill pillows, towels, rolls, or other devices that will keep the spill from spreading.

4. If there is no immediate danger, cleanup procedures listed on the MSDS should be followed. Appropriate personal protective equipment shall be used and waste disposal procedures followed.

5. A spill kit must be accessible for each laboratory. The kit should include at least the following as appropriate to the hazards present:

   - Spill control pillows
   - Inert absorbents such as vermiculite, clay, sand, or kitty litter
   - Neutralizing agents for acid spills such as sodium carbonate and sodium hydrogen carbonate
   - Neutralizing agents for alkali spills such as sodium hydrogen sulfate and citric acid
   - Quantities of cleanup materials sufficient for the largest anticipated spill.
   - Large plastic scoops and other equipment such as brooms, pails, bags, and dustpans.

- Appropriate personal protective equipment

6. If the spill material was a hazardous chemical, all of the materials involved in the cleanup will usually be considered to be hazardous waste and must be disposed of as such.

7. Individuals exposed to hazardous chemicals should respond immediately.

   - In the case of eye exposure, flush eyes promptly with water for 15 minutes and seek medical evaluation.

   - In the case of skin contact, flush the affected area promptly with water and remove any contaminated clothing. Seek medical evaluation as necessary.

   - In the case of inhalation, isolate the individual from the fumes (i.e. move him/her to fresh air) and seek medical evaluation.

   - A copy of all appropriate MSDSs should accompany anyone sent for medical evaluation because of injury and potential exposure to hazardous materials. MSDSs are available from the Laboratory Manager/Chemical Safety Officer.

8. In the event of any significant spill an Incident Report (Appendix D) should be completed and returned to the CSO.

9. For chemical spills beyond the clean up and response capabilities of Temple personnel, Temple has a relationship established with the following:

Name	Phone
Temple Fire Department/ Hazmat Unit 505 North 3rd Street, Temple, TX 76501	911

4.11 Emissions to the Environment

Chemical users at Temple shall review all new and ongoing laboratory operations to determine if the potential exists for the emission of hazardous materials into the environment. If emissions into the environment are possible, the individual must:

1. Consult with the Chemical Safety Officer to determine the appropriate controls needed to limit the amount of environmental emission.

2. Contact the VPAS to obtain any required licensing, permits, or approval from local, state, and federal agencies.

5.0 CONTROL MEASURES

5.1 Reduce Exposure to Hazardous Chemicals

The purpose of this section is to provide the framework for selecting control measures to minimize the risk of chemical hazards. Given the enormous variety of hazardous materials and potential operations, Temple has adopted the following guidelines.

Chemical hazards are reduced through various control measures that work in unison to minimize exposure. These measures include the following (in order of preference):

1. *Chemical Substitution* – Such as using a less hazardous compound.
2. *Engineering Controls* - Such as fume hoods, designated areas, security devices, and facility design.
3. *Administrative Controls* - Such as written safety procedures, training, limited access, and medical surveillance.
4. *Personal Protective Equipment* - Such as respirators, gloves, face shields, and chemical resistant clothing.
5. *Work Practices* - Such as personal hygiene and laboratory technique.

Selection of Controls

After preparing a chemical hazard analysis, a combination of controls may be used based on:

1. The inherent toxic and physical properties of the materials and their intended use.
2. The possibility of unplanned outcomes, spills and accidents.
3. Possible exposure routes (inhalation, skin contact, eye contact, or ingestion).
4. Skills, training, and prior experience of the chemical user.

Selection of the final control measures must be made by the department chair who consults with the Chemical Safety Officer. Consultation is especially needed for new operations and any operations involving particularly hazardous substances (see Section 10).

5.2 Personal Protective Equipment

The following Personal Protective Equipment (PPE) should be considered as control measures for use within the laboratories to control safety hazards.

1. It is the responsibility of Temple to provide appropriate safety and emergency equipment for employees and students that is compatible with the required degree of protection for the substances being handled.

2. Where necessary, procedures should be prepared on the use of eye, skin, body protection, respirators, and/or other protective gear.

3. Individuals must wear eye protection when visiting or working in areas where hazardous chemicals are handled. All eye protection devices should conform to ANSI Standard Z87.1-1989. Eyeglasses, even with side shields, are not acceptable protection against chemical splashes.

4. Chemical splash safety eyewear should be used as the standard protective eyewear. Such eyewear should fit the face surrounding the eyes snugly to protect the eyes from a variety of hazards.

5. Any experiment that involves heating or the use of chemicals, or glassware shall require the use of chemical splash safety eyewear. The eyewear also serves to reduce dust and fumes from reaching the eye.

6. Contact lenses are not necessarily prohibited in the laboratory. If contact lenses are permitted, chemical splash eyewear must be worn at all times.

7. Full-face shields protect the face and throat. They must be worn for protection when there is a greater risk of injury from flying particles and harmful chemical splashes. A full-face shield should also be worn when an operation involves a pressurized system that may explode or an evacuated system that may implode as determined when needed by the responsible department. For full protection, safety goggles must be worn with the face shield.

8. Standing shields should be used when there is a potential for explosions, implosions, or splashes, or when corrosive liquids are used as determined when needed by the responsible department. Safety eyewear should be worn whenever using a standing shield.

9. A standing shield should be used for group protection from chemical splash and impact as determined when needed by the responsible department. The standing safety shield should be used with safety eyewear and, if appropriate, with a face shield.

10. Lab coats or aprons worn in the laboratory should offer protection from splashes and spills, and should be easy to remove in case of an accident, and should preferably be fire resistant.

11. When gloves are required, it should be remembered that no one kind of glove is suitable for all situations. The MSDS should be consulted for information regarding the proper type of gloves to be used.

12. Gloves must be worn during transfer of hazardous chemicals from one container to another or during the transfer of chemical waste. Gloves are available in all prep rooms and in each individual lab. Gloves should be inspected before use to ensure that there are no holes, blisters, and cracking or other ways for the

chemical to pass through the glove onto the hand and should be replaced periodically or when damaged or punctured.

13. If necessary, individuals shall be trained in the proper use of respirators and shall wear them whenever exposure by inhalation is likely to exceed OSHA or ACGIH limits.

14. Carefully inspect all protective equipment before using. Do not use defective protective equipment. The choice of protective clothing depends on the degree of protection required and shall be set by the department using the equipment with consultation of the CSO and Department Chair.

5.3 Hazard Identification and Labels

The following SOP's will be followed for hazard identification and labels.

1. Laboratory chemicals should be properly labeled to identify any hazards associated with them.

2. Newly purchased chemicals stored in original bottles, must have the manufacturer's original label identifying potential hazards, the date of purchase, and the date it is first opened.

3. Chemicals transferred to a secondary container, must be appropriately labeled with the chemical name, formula, concentration (if in solution), solvent (if in solution), hazard warnings. See Appendix E for a template label example.

4. Unlabeled bottles of unknown contents should not be opened, and such materials should be disposed of as discussed in the Waste Management Plan.

5.4 Signs and Posters

The following SOP's will be followed for signs and posters.

1. All lab employees must be alerted to hazards in an area they enter. The employer shall post a sign at the location where notices are normally posted to inform employees that they have the right to information regarding toxic substances found in the workplace.

2. Signs shall be used to indicate the location of exits, evacuation routes, safety showers, eyewash stations, fire extinguishers, fire blankets, first aid kits, fume hoods, and other safety equipment.

3. Telephone numbers of emergency personnel, facilities, supervisors, and the CSO must be posted next to the phone in each lab, storeroom/stockroom, and storage area.

4. Flammable storage cabinets and refrigerators must be labeled according to local fire regulations. Emergency telephone numbers shall be posted in all laboratory areas.

5.5 Material Safety Data Sheets (MSDS)

The following SOP's will be followed for the use and retention of MSDS.

1. Each MSDS received should be maintained and made readily available to laboratory employees and to students.

2. The MSDS for each chemical usually gives guidelines to exposure limits. Typical limits are expressed as threshold limit values (TLVs), permissible exposure limits (PELs), or action levels. Such limits along with any other information about the hazardous characteristics of the chemical should be used to set laboratory guidelines. These laboratory guidelines may be used in determining the safety precautions, control measures, and personal protective equipment that apply when working with the toxic chemical.

3. An MSDS for each chemical must be maintained and made available by the CSO. MSDS' must be retained for 30 years from the last date used.

5.6 Records Retention

The following records are to be maintained by the CSO or department designee:

- An annual inventory of all chemicals and chemical usage;
- Repairs and regular inspection and maintenance of safety equipment (including fume hoods);
- Employee safety training;
- Incident reports;
- Air monitoring data, exposure assessments, medical consultations, and medical examinations;
- Waste disposal manifests and records for laboratory waste; and
- MSDS.

5.7 Exposure Monitoring

The following SOP's will be followed for exposure monitoring.

1. If there is reason to believe that exposure levels for a regulated substance have exceeded the action level or permissible exposure limit, the CSO should ensure that the employee or student exposure to that substance is measured.

2. Factors which may raise the possibility of overexposure and therefore warrant an initial measurement of employee or student exposure include:

   - The manner in which the chemical procedures or operations involving the particular substances are conducted.
   - The existence of historical monitoring data that shows elevated exposures to the particular substances for similar operations.
   - The use of a procedure that involves significant quantities or is performed over an extended period of time.
   - There is reason to believe that an exposure limit may be exceeded.
   - Judicious use of signs or symptoms of exposure (e.g., skin or eye irritation, shortness of breath, nausea, or headache), which are experienced by employees or students. (Some of these symptoms are very general and can be due to many other causes including emotional stress or hysteria.)

3. If the substance in question does not have an exposure monitoring or a medical surveillance requirement, exposure monitoring and medical surveillance shall be continued until exposure levels are determined to be below the action level or 50% of the PEL. In the absence of PELs, the American Conference of Governmental Industrial Hygienists (ACGIH) TLVs should be referenced.

4. If a substance has an exposure-monitoring requirement and if there is reason to believe that exposure levels for that substance routinely exceed the action level or in the absence of the action level, the PEL, the employer shall measure the employee or student exposure to the substance.

5. If the initial monitoring (described in above) discloses employee exposure over the action level or in the absence of an action level, the PEL, Temple shall immediately comply with the exposure monitoring provisions of the relevant standard for that substance.

6. Temple shall, within 15 working days after the receipt of any monitoring results notify the employee or student of these results in writing either individually or by posting the results in an appropriate location that is accessible to employees.

6.0 SAFETY/EMERGENCY FACILITIES AND EQUIPMENT

6.1 Reporting Lab Incidents and Unsafe Conditions

The following SOP's will be followed for reporting lab incidents and unsafe conditions.

1. Report all significant lab incidents to the instructor, department designee and to the CSO. Incident report forms are available in the department office, from the CSO and in Appendix D of this plan. Unusual or unexplainable chemical reactions should be discussed with others in the department, to caution others as to the risk of the procedure. **Personal reactions to chemicals that are not**

identified on the MSDS should be reported to the EPA, with the advice of legal counsel, under the Toxic Substance Control Act (TSCA) Section 8 regulations.

2. Report any unsafe conditions by contacting the faculty/staff of the area who in return should notify the department chair and should file a written report with the CSO so that the condition may be corrected. Unsafe conditions that must be reported include:

    - Nonfunctioning hoods in the science area;
    - Unsafe storage conditions;
    - Blocked emergency exits;
    - Improperly charged fire extinguishers;
    - Eyewash stations or safety showers that do not work or are blocked; and
    - Absence of personal protective equipment.

    A template for reporting a safety concern is available in Appendix G.

6.2 Proper Equipment Use

The following SOP's will be followed for proper safety equipment use.

1. Use equipment only for its intended purpose.
2. Inspect equipment or lab apparatus for damage before use. Never use damaged equipment such as cracked glassware or equipment with frayed electrical wiring.
3. Consult user manual prior to using equipment for the first time.
4. Airflow through fume hood should be calibrated and documented annually.

6.3 Emergency Equipment

The following SOP's will be followed for the availability and use of emergency equipment:

1. Emergency equipment items that should be available include: eyewash station, fire extinguisher of the appropriate type, safety shower, telephone for emergencies, fire blanket, and identification signs;
2. Each lab prep area that connects to a laboratory within the lab building should have a standard first aid kit;
3. Safety equipment will be tagged following an inspection, showing the date, inspector, and results;

4. Laboratories in which hazardous substances are being used should have spill control kits tailored to deal with the potential risk associated with the materials being used. If there is no immediate danger to employees or students, containment should be accomplished by spill pillows, towels, rolls, inert absorbents, neutralizing agents, or other devices; and

5. The path to emergency equipment should remain clear at all times.

6.4 Fume Hoods

Specific measure shall be taken to ensure proper installation and adequate performance of fume hoods and other safety equipment, including alarm systems. Temple has adopted guidelines from:

- "Prudent Practices in the Laboratory: Handling and Disposal of Chemicals, Revised edition" published in 2011 by the National Research Council. (Available from National Academy Press, 2101 Constitution Avenue, N.W., Washington, D.C. 20418 and online at www.nap.edu)
- "CRC Handbook of Laboratory Safety, 5th Edition," published in 2000 by A. Keith Furr. (Available from CRC Press, 2000 N.W. Corporate Boulevard, Boca Raton, Florida 33431.)

Consult with the Chemical Safety Officer or appropriate department personnel before making changes to existing systems and/or to obtain the criteria for unique experimental setups.

The Chemical Safety Officer shall conduct regular performance checks on all fume hoods and safety equipment used for hazardous materials. Before working with hazardous material, however, the user should always verify that the fume hood and/or equipment is operating properly. Users noting a deficiency in a fume hood or with safety equipment should immediately notify the Chemical Safety Officer. A fume hood or piece of equipment that is not operating as intended shall not be used for hazardous procedures. To ensure safety, fume hoods used for hazardous materials (e.g., toxic, radioactive, and /or flammable substances) must have continuous monitoring devices to alert users to their less-than-adequate performance.

1. Best management practices indicate that all fume hoods be vented so that a minimum average face velocity of 100 feet per minute is achieved. This minimum flow should be checked annually.

2. Hoods are to be used for the following:

   - When the chemical is a known or suspected carcinogen, reproductive hazard, sensitizer, or toxic chemical.
   - When handling large quantities of chemicals (more than 500 milliliters of liquid or more than 30 grams of a solid)
   - When handling sizable amounts of flammable and reactive substances

- When mixing sizable volumes of acid dilutions
- When handling a substance that is fine and may create a dust

3. Check fume hoods before use to ensure adequate functioning. File a safety concern requesting hood maintenance if there is a problem and contact the CSO or appropriate faculty/staff immediately. Report all improperly functioning fume hoods to the CSO by way of completing a safety concern form (Appendix G).

4. According to the National Fire Protection Association (NFPA), the hood sash should be closed when not in use. If chemicals remain in the hood after use, they should be placed in the rear of the hood and the fan left on.

5. Keep equipment and bottles in use, at least 6 inches from the front of the hood.

6. Connect electrical equipment to outlets outside the hood when possible.

7. Wash the work platform often to maintain a clean, dry surface.

8. Do not use the hoods for a storage area. Once the chemicals are not in use for an experiment remove all bottles to their correct storage areas.

6.5 Ventilation

General laboratory ventilation should not be relied on for protection from exposure to hazardous chemicals. A rate of 4 - 12 room air exchanges per hour should be the accepted standard when local exhaust systems, such as hoods, are used as the primary method of control. Exhaust from the fume hoods should be vented directly to the outside.

6.6 Flammable Storage

The following SOP's will be followed for the storage of flammable materials.

1. Chemicals with a flash point below 93.3 ° C (200 ° F) or any chemical with a MSDS label indicating "Flammable" is considered a "fire hazard chemical".

2. Fire hazard chemicals in excess of 500 mL should be stored in safety cans or in storage cabinets designed for flammable materials.

3. When transferring significant quantities of flammable liquids (5 gallons or more) from one container to another, it is particularly important that they be properly grounded to prevent accidental ignition of flammable vapors and liquids from static electricity or other sources of ignition.

6.7 Electrical

The following SOP's will be followed for electrical outlets and circuits.

1. All electrical outlets should have a grounding connection accommodating a three-prong plug.

2. All laboratories should have circuit breakers readily accessible. Employees should know how to cut-off electricity to the laboratory in case of emergency.

3. Ground-fault circuit interrupters are required by code to protect users from electrical shock, particularly if an electrical device is hand held during a laboratory operation.

7.0 TRAINING

The primary goals of the environmental, safety, and health (ES&H) policies of Temple are to protect individuals from harm, prevent property damage, and limit environmental impact. The OSHA Laboratory Standard stipulates that individuals must be provide with specific information about the chemical hazards in their work area and trained on how to handle such chemicals. Thus, chemical users shall receive the required training that will enable them to take every reasonable precaution in the performance of their work. The training must be conducted and documented in accordance with this Chemical Hygiene Plan and OSHA requirements.

Training can be accomplished through formal courses, informal instruction, and/or on-the-job-training. All training, however, must be documented. All affected employees and new hires will be trained initially in the CHP and then routinely thereafter. The frequency for refresher training is not stipulated in the OSHA regulation. Temple will conduct annual CHP refresher training to ensure all affected employees are thoroughly familiar with the plan.

7.1 Required Information

Individuals working in laboratories at Temple shall be provided with the following information:

1. Employees shall be informed of the location of hazardous chemicals in the work area at the time of initial assignment, and before each new assignment, that involves chemicals to which an individual may be exposed.

2. Employees shall be informed of the content of the "Laboratory Standard," 29 CFR Part 1910. Employees shall also be informed of the location and availability of the CHP.

3. Employees shall be informed of the permissible exposure limits (PEL's) or Threshold Limit Values (TLV's) for OSHA regulated substances on site or recommended exposure limits for other hazardous chemicals on site where there is no applicable OSHA standard.

4. Employees shall be informed of the location and availability of known standard reference material on the hazards, safe handling, storage and disposal of hazardous chemicals where there is no applicable OSHA standard.

5. Employees shall be informed of the location of MSDS.

6. Employees shall be informed of the location of personal protective equipment and of emergency equipment as outlined in the CHP.

7. Employees shall be informed of the signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.

7.2 Employee Training

Employees will be provided with information and training to ensure that they are apprised of the hazards of chemicals present in their work area, the proper procedures to minimize risk of exposure; and the proper response to accidents.

These orientations and training sessions will cover the following:

- Contents of the Laboratory Standard and its appendices and how Temple has responded to meet its responsibilities, location and availability of the CHP, MSDS, and resources on lab employee health and safety.
- How to read an MSDS and understand the content
- Physical and health hazards of chemical classes
- Signs and symptoms of exposure
- Use of fume hoods and PPE
- Special operating procedures to be used for extremely hazardous chemicals
- How to conduct a laboratory inspection
- Protocol for dealing with permissible exposure limits and other recommended limits
- How to file incident reports and safety concerns by using the appropriate forms.
- Methods and observations used to determine the presence or release of a hazardous chemical, such as periodic monitoring devices, continuous monitoring devices, and the visual appearance or odor of hazardous chemicals being used.
- Control measures to protect individuals from chemical hazards. These include appropriate engineering and administrative controls, personal protective equipment, work practices, and emergency procedures.
- Physical and health hazards in the work area, including flammable and reactive materials, irritants and corrosives, acute poisons, chronic organic toxins, allergens, and genetic toxins.
- Proper labeling, storage, and waste disposal practices.
- Applicable details of this Chemical Hygiene Plan.

Employees should be trained on the potential chemical hazards in the employees' work areas and on appropriate sections of the CHP. This training should be provided to all employees who actually work in the laboratory as well as to other employees whose assignments may require that they enter a laboratory where exposure to hazardous chemicals might occur.

The training an employee receives should be determined by the nature of the work assignment in the laboratory.

7.3 Student Training

Students should receive the following training at a minimum.

1. Instruction in laboratory safety shall be provided to all students involved in laboratory activities.

2. The extent of student training should be based on the CHP, and the level of chemical handling and potential exposure to hazardous chemicals.

3. Safety training should include the importance and the content of the label and of MSDS.

4. At the beginning of the semester and prior to laboratory activities, the necessary class time shall be devoted to safe laboratory practices and to the student safety agreement available in Appendix I.

8.0 HAZARD EVALUATION

Temple prohibits employees/students from accepting used equipment, chemicals, or biological specimens donated by other universities, institutions, or private companies without prior authorization from the administration. While transfer of such items may have been a routine practice at one time, the expense, space limitations, special storage requirements, liability, and/or regulatory restrictions no longer justify this practice. Exemptions to this policy shall require the written approval of the Chemical Safety Officer, Department Head receiving the donations, and the Chief Operating Officer.

Temple prohibits the use, possession, synthesis, or administration of prescribed medications and controlled substances in the laboratory. Exemptions to this policy will be granted only if:

1. A detailed protocol is submitted to the Chief Operating Officer setting forth the nature of the proposed experiments, the qualifications of the employees/students who will engage in the experiments, the proposed quantity of each prescribed medication and/or controlled substance involved, and the measures necessary to provide for security and proper record keeping.

2. The VPAS, in consultation with Temple General Counsel and Chemical Safety Officer approves the detailed protocol.

3. Appropriate licensure, permits, and/or approval are secured under Texas Law.

4. Appropriate licensure, permits, and/or approval are secured from the Federal Food and Drug Administration (FFDA).

5. Appropriate licensure, permits, and/or approval are secured from the Drug Enforcement Administration (DEA).

Additional hazard evaluations will be made for the following.

1. The CSO and/or Department Chair should be notified whenever a new laboratory experiment or test is to be carried out involving extremely hazardous materials that would present a significant increase in the present of potential harm. This notification should also be sought for experiments that have not been performed recently or for which the potential for a high degree of harm is present. The potential for harm may be affected by a change in the amounts of materials being used, the conditions under which the experiment is to be conducted, or the substitution, deletion, or addition of a chemical.

2. Notification of procedural changes should be submitted where one or more of the following conditions exist that would present a significant increase in the presence of potential harm:

    - Potential for a rapid rise in temperature in a non-routine manner.
    - Potential for a rapid increase in pressure in a non-routine manner.
    - Use of a flammable solvent in a non-routine manner.
    - Potential for a chemical explosion.
    - Potential for spontaneous combustion.
    - Potential for the emission of toxic gasses that could produce concentrations in the air that exceed toxic limits.
    - Involves the use of a highly toxic substance.

3. Notification will be initiated by use of the Lab Procedure Change form, available in Appendix H.

4. Chemicals should not be distributed to other persons or to other areas of the school without the prior approval of the department chair and notification of the CSO. Chemicals should not be transferred to another location without the simultaneous transfer of a copy of the appropriate MSDS, nor should they be transferred without the person receiving the chemicals having had an appropriate training in their use, storage, and disposal.

5. Students shall only work in a laboratory or chemical storage area under the direct supervision of a science teacher.

9.0 MEDICAL CONSULTATION AND EXAMINATION

Significant injuries or chemical exposures in the laboratory should be reported immediately to the department chair, Campus Security if needed and the CSO. Medical attention following a significant injury or exposure to chemicals in the laboratory should be sought. Consultation, examination, and treatment by licensed physicians and nurse practitioners are available to all employees/students of Temple. In the event of a known acute exposure, referral should be prompt to ensure that appropriate decontamination and medical care are provided in a timely manner.

1. Temple staff working with hazardous chemicals shall receive medical care consistent with established worker's compensation procedures whenever:

   - An employee develops signs and symptoms of exposure associated with chemicals he/she is using, or may be in contact with OSHA regulated substances measured above "actual" permissible exposure limits.
   - An employee is present at a chemical spill, leak, explosion, or other situation that exposes him/her to a hazardous chemical.
   - An event such as a cut, puncture, spill, leak, or explosion results in exposure to a hazardous material.

2. The college will provide the examining physician with:

   - The generic and trade names of all hazardous chemicals and chemical compounds to which the employee may have been exposed.
   - MSDS and any other relevant data.
   - Conditions under which the exposure occurred.
   - Signs or symptoms of exposure experienced by the employee during, soon after, and within 72 hours after the incident.
   - The results of the investigation of the incident, including witness interviews.
   - Any monitoring or test results.

3. The College and employee shall obtain a written opinion from the examining physician. The written opinion should include:

   - Recommendation for medical follow-up.
   - The results of all medical examinations.
   - Any medical condition the employee has that places him/her at risk as a result of future exposure to hazardous chemicals.
   - A statement confirming the employee was advised of the risks.
   - The opinion must not reveal specific findings of diagnoses unrelated to

occupational exposure if such limitation is within the control of Temple.

4. Medical attention includes:

   - Medical history and examination.
   - Specific treatment as necessary.
   - Laboratory tests if required.
   - Follow-up examinations, treatments, and laboratory tests as needed.

10.0 PARTICULARLY HAZARDOUS SUBSTANCES

Special consideration shall be given to protecting employees/students from particularly hazardous chemicals. For the purposes of this Chemical Hygiene Plan, these include designated carcinogens, reproductive hazards, allergens, extremely flammable substances, highly reactive, and acutely toxic materials.

When particularly hazardous substances are used in laboratories at Temple, the specific control measures below shall be implemented for additional protection. The department designee shall be NOTIFIED, and the CSO informed, for identification of particularly hazardous substances and for guidance on selecting controls.

1. Establish "designated areas" (see definitions). The chemical user and/or Chemical Safety Officer shall ensure that the appropriate warning signs are posted in these areas.

2. Use containment devices (e.g., fume hoods or glove boxes) when:

   a. Volatilizing substances.

   b. Manipulating substances that may generate aerosols.

   c. Using laboratory procedures that may result in an uncontrolled release of the substance.

3. Use high-efficiency particulate air (HEPA) filters, carbon beds, or scrubber systems with containment devices to protect effluent and vacuum lines, pumps, and the environment whenever feasible.

4. Establish procedures for the safe removal of contaminated waste. Disposal of any particularly hazardous substance is controlled by government regulations.

5. Ensure that chemical residues do not remain on the body, clothing, or equipment. Employees/students shall follow Standard Operating Procedures upon completing work with particularly hazardous substances or in the event of accidental contact with such chemicals.

6. Inform employees/students of the hazards in designated areas. Be sure that those individuals who work in designated areas are authorized to do so, and that they are trained on how to handle the hazards in such areas. All training provided shall be documented.

10.1 General

General procedures for particularly hazardous substances include:

1. Employees should read and understand these practices before commencing a procedure using particularly hazardous substances (PHS).

2. PHS includes highly toxic chemicals, reproductive toxins, and select carcinogens. In addition, Temple includes highly flammable chemicals, highly reactive chemicals, and highly corrosive chemicals as PHS.

3. The use of these substances requires prior approval of the department designee and notification of the CSO (Appendix H).

4. PHS shall be used in designated areas and in fume hoods.

5. The use of PHS shall require removal of contaminated waste and the decontamination of contaminated areas.

10.2 Highly Toxic Chemicals

The precautions below shall be taken when working with chemicals of high-chronic toxicity. Examples of these types of substances include dimethylmercury and nickel carbonyl, benzo[a]pyrene, N-nitrosodiethylamine, and other human carcinogens or substances with high carcinogenic potency in animals. Other examples of highly toxic chemicals (acute or chronic) that were commonly used are benzene, chloroform, formaldehyde, bromine, carbon disulfide, carbon tetrachloride, cyanide salts, and hydrofluoric acid.

1. When a PEL or TLV value is less than 50 ppm or 100 mg/m^3 conduct all transfers and work with these substances in a "controlled area" (e.g., a restricted access hood, glove box, or part of a laboratory designated for working with such substances). Ensure that all persons with access to controlled areas are aware of the substances being used and the precautions required. If none are available, no work should be performed using the chemical.

2. Protect vacuum pumps from being contaminated by scrubbers or HEPA filters; vent them into the hood.

3. Decontaminate the controlled area before normal work is resumed.

4. Remove any contaminated protective apparel and thoroughly wash hands, and other exposed areas of skin after use of these chemicals. Place the apparel in an appropriately labeled container.

5. Use a wet mop or a vacuum cleaner with a HEPA filter if the toxic substance is a dry powder; do not dry sweep.

6. Initiate a regular medical surveillance program if large quantities of toxic substances are used.

7. Ensure that the controlled area is conspicuously marked with warning and restricted access signs, and that all containers with these substances are appropriately identified and have warning labels.

8. Ensure that contingency plans, equipment, and materials are available to minimize exposures to people and property if an accident occurs.

9. Store chemicals in unbreakable, chemically resistant, secondary containers. Label the containers appropriately and store them in a ventilated, limited-access area.

10. If a PEL, TLV, or comparable value is not available, the animal or human median inhalation lethal concentration information, LC 50, should be used as a guideline. If that value is less than 200 ppm or 2000 mg/m^3 when administered continuously for one hour or less, then the chemical should be used in an operating fume hood, glove box, vacuum line, or other device equipped with appropriate traps. If none are available, no work should be performed using that chemical.

10.3 Highly Flammable Chemicals

General procedures for highly flammable chemicals include:

1. Temple defines Class 1A liquids as highly flammable chemicals. Class 1A liquids have a flashpoint of less than 73°C (163.4°F) and a boiling point of less than 100°C (212°F).

2. Examples of highly flammable chemicals are diethyl ether, acetone, pentane, petroleum ether, and acetaldehyde.

10.4 Highly Reactive Chemicals

General procedures for highly reactive chemicals include:

1. Reactivity information may be given in a manufacturers' MSDS and on labels. The most complete and reliable reference on chemical reactivity is the current edition of *Bretherick's Handbook of Reactive Chemical Hazards.* A Chemical Compatibility Chart has been provided as Appendix F.

2. A reactive chemical is one that:

   - Is described as such on the label, in the MSDS, or by Bretherick.
   - Is ranked by the NFPA as 3 or 4 for reactivity (the yellow portion of the NFPA diamond).

- Is identified by the Department of Transportation (DOT) as an oxidizer, an organic peroxide, or an explosive (Class A, B, or C).
- Fits the Environmental Protection Agency definition of reactive in 40 CFR 261.23, or is known or found to be reactive with water.

3. Reactive chemicals should be handled with all proper safety precautions, including segregation in storage (refer to Chemical Compatibility Chart, Appendix F), and prohibition of mixing even small quantities with other chemicals without prior approval and appropriate personal protection and precautions.

4. Examples of commonly encountered highly reactive chemicals are ammonium dichromate, nitric acid, perchloric acid, hydrogen peroxide, (≥30%) and potassium chlorate, azides, organic nitrates, and acetylides.

10.5 Highly Corrosive Chemicals and Contact Hazard Chemicals

General procedures for highly corrosive chemicals and contact hazards include:

1. Corrosivity, allergen, and sensitizer information is provided in manufacturers' MSDS and on labels.

2. A corrosive chemical is one that:

- Fits the OSHA definition of corrosive in 29 CFR 1910. 1200.
- Fits the EPA definition of corrosive in 40 CFR 261.22 (has a pH greater than 12.5 or a pH less than 2).
- Is known to be reactive to living tissue, causing visible destruction, or irreversible alterations of the tissue at the site of contact.

3. A contact - hazard chemical is an allergen or sensitizer that:

- Is so identified or described in the MSDS or on the label.
- Is so identified or described in medical or industrial hygiene literature.
- Is known to be an allergen or sensitizer.

4. Corrosive and contact hazard chemicals will be handled with all proper safety precautions, including wearing safety goggles, using gloves tested for the absence of pinholes and known to be resistant to permeation or penetration by the chemical, and wearing a laboratory apron or laboratory coat.

5. Examples of highly corrosive chemicals are hydrochloric, sulfuric, nitric, phosphoric, and perchloric acids (all acids in greater than 1 Molar concentration), and potassium hydroxide (either solid or in aqueous solution greater than 1 Molar concentration).

10.6 Reproductive Toxins

General procedures for reproductive toxins include:

1. A reproductive toxin refers to chemicals which affect reproductive capabilities including chromosomal damage (mutations) and which effect fetuses (teratogenesis).

2. A reproductive toxin is a compound that is described as such in the applicable MSDS or label.

3. No reproductive toxins should be allowed in the school's laboratories without written authorization from the CSO.

4. If such chemicals are used:

   - They should be handled only in a hood and when satisfactory performance of the hood has been confirmed.
   - Skin contact should be avoided by using gloves and wearing protective apparel.
   - Persons using such substances should always wash hands and arms immediately after working with these materials.
   - Unbreakable containers of these substances should be stored in a well ventilated area and will be labeled properly.

5. Examples of reproductive toxins are organomercurial compounds, ethidium bromide, carbon disulfide, xylene, toluene, benzene, mercury, lead compounds, ethyl ethers, and vinyl chloride.

10.7 Allergens and Embryotoxins

The precautions below shall be taken when working with allergens and embryotoxins.

1. Review each use of these materials with the research supervisor; review continuing uses annually or whenever a procedural change is made.

2. Properly label these substances; store them in an unbreakable secondary container in an adequately ventilated area.

3. Notify supervisors of all incidents of exposure or spills; consult a qualified physician when appropriate.

4. Examples of and the requirements for these substances area as follows:

   a. *Allergens* – Wear suitable gloves to prevent hand contact with allergens or substances of unknown allergenic activity (e.g., diazomethane, isocyanates, and bichromates).

b. *Embryotoxins* – If you are a woman of childbearing age, only handle these substances (e.g., organomercurials, lead compounds, and fomamide) in a hood that functions properly. Use appropriate protective apparel (especially gloves) to prevent skin contact.

11.0 MAINTENANCE AND INSPECTION PROGRAM

Temple should implement a maintenance and inspection program to ensure that ventilation systems and emergency safety equipment are functioning properly and that lab working conditions meet legal and acceptable standards. The maintenance and inspection program should target facilities known to be using extremely hazardous chemicals including known potential carcinogens, highly acutely toxic, reproductive toxins, allergens, and others. Currently, ENV Services Inc. inspects lab hoods on an annual basis.

11.1 Maintenance Program

The general ventilation system in labs must be well maintained and the quantity and quality of airflow monitored every three months by Facilities Management to ensure that:

1. General ventilation provides fresh air eight (8) to fourteen (14) air changes per hour to all labs. All exhaust air from labs is vented to the outside and not circulated throughout the building. Special attention will be paid to labs in which fume hoods are routinely operating to ensure a proper balance of airflow.

2. All chemical storage areas receive six air changes an hour, and exhausted air is not re-circulated through the facility. Centralized heating, ventilation, and cooling systems that impact labs will be maintained by:

   - Filters changed or cleaned;
   - Water frequently checked for proper flow and biological growth; and
   - Drip pans cleaned regularly.

3. The fume hood maintenance program comprises:

   - Fans checked for bearing over heating, belt drives for proper tension, fan wheels for proper freedom from accumulations and rotation;
   - Ductwork check for intact joints and no dents or holes in the system;
   - Visual inspection of the hood will be done to check for signs of corrosion or other indications of needed repairs; and
   - Cleaning the surface of the hood, the sash glass, and the light unit will be cleaned.

4. Emergency eyewash and deluge showers:

   - Monthly inspections/tests of the eyewash stations/showers will be conducted by the appropriate Department Coordinator, Lab Coordinator or College

Building Coordinator. Any problems should be reported to the CSO and Facilities Management immediately.

5. Fire extinguishers:

   - All fire extinguishers will be visually inspected on a monthly basis by the appropriate Department Coordinator, Lab Coordinator or College Building Coordinator. The visual inspection will ensure that the fire extinguishers are in their assigned locations, not blocked, pressure gauges show adequate pressure, pins and and/or seals are in place (not tampered with), nozzles are free of blockage and that they are free of any visual damage. Problems should be reported to the CSO immediately.
   - The Maintenance Department will also ensure an outside company completes a formal maintenance check on the fire extinguishers annually.

11.2 Inspections

The inspection protocols will consist of the following:

1. The CSO will conduct semiannual inspections of all labs for unsafe conditions and practices, and test key safety equipment to ensure proper functioning (Appendix B). Before the inspections, the CSO will have completed and updated the chemical inventory.

2. The CSO will write inspection reports identifying problems needing immediate attention and those of a lesser priority. Inspection results will be discussed with the department chair and lab workers, indicating the follow-up needed to correct any problems.

3. The CSO will evaluate fume hood performance using smoke tubes to determine if the hood is exhausting and will monitor the rate of flow at the face as well as the uniformity of air delivered to the hood by making a series of face velocity measurements at various points. Each measurement should not vary more than 25%.

4. Facilities Management should be notified of any problem with emergency equipment. The following should be checked:

   - Emergency exits;
   - Fire extinguishers;
   - Availability of spill-control emergency equipment;
   - Availability of MSDS;
   - Proper and working protective equipment is in the facility;
   - General housekeeping conditions and systems used to communicate hazards;
   - Storage areas for proper segregation of chemical classes, storage facilities, and container integrity; and
   - Waste disposal practices.

As routine policy, the second inspection of the year will focus on labs in which improvements should have been made, either by lab employees or by management. Any serious or potentially serious lab safety and/or health problems will be identified and a schedule of steps and a time frame for completing them will be prepared by the CSO.

12.0 EMERGENCY SERVICES CONTACT INFORMATION

Name	Phone Number Off-site
Campus Safety	(254) 298-8291
Temple Fire/Hazmat Department Non-Emergency Emergency	 (254) 298-5682 911
Temple City Police Department Non-Emergency Emergency	 (254) 289-5500 911
GDF SUEZ Energy Resources	1-866-998374
National Weather Service	615-754-4633
Poison Control Center	615-936-2034
Texas Emergency Hotline	800 241-4113

Temple College Employees	
Name	Phone Number
Coordinator of Safety Programs Mr. Seth Vance Environmental, Health and Safety	(254) 298-8593
Chemical Safety Officer Mr. Seth Vance	(254) 298-8593
Facilities Dr. Van Miller Vice President, Administrative Services Charlotte Bales Maintenance	 (254) 298-8601 (254) 289-8690

APPENDIX A

DESIGNATION OF CHEMICAL SAFETY OFFICER

3.0

Temple College

2600 SOUTH FIRST STREET
TEMPLE, TEXAS 76504

Memorandum

TO: Mr. Seth Vance

From: Dr. Van Miller, VP of Administrative Services, Temple College

Date: January 10, 2013

Subject: Designation of Chemical Safety Officer

In accordance with the requirements set forth in 29 CFR 910.1450, you are hereby designated as the Chemical Safety Officer for Temple College. As such you are responsible for the implementation of the Chemical Hygiene Plan and its annual review.

Signature: _____

Date: _____

APPENDIX B

SEMI-ANNUAL INSPECTION OF LABORATORIES AND CHEMICAL STORAGE AREAS

Temple College
Chemical Hygiene Inspection Checklist

Date of Inspection: _____ Conducted by: _____

Location (room number & building): _____

Laboratory Supervisor: _____

Phone Number: _____

1.0 GENERAL WORK PRACTICES

☐ Yes ☐ No ☐ NA 1.1 Eating, drinking, smoking, etc. prohibited in the lab or designated lab areas.

☐ Yes ☐ No ☐ NA 1.2 Mouth pipetting prohibited

☐ Yes ☐ No ☐ NA 1.3 Food, drink not stored in lab, refrigerators, freezers, etc. except for those items required for experimental use, but not consumption.

☐ Yes ☐ No ☐ NA 1.4 Hands washed when work completed

☐ Yes ☐ No ☐ NA 1.5 All particularly hazardous substances are handled in laboratory hoods, as appropriate.

☐ Yes ☐ No ☐ NA 1.6 Open flames, sparks kept away from flammables

☐ Yes ☐ No ☐ NA 1.7 Contact phone nos. for lab supervisor and safety officer current

☐ Yes ☐ No ☐ NA 1.8 Dress code prohibits bare toes, bare arms and bare legs while working with chemicals as determined by the department.

2.0 HOUSEKEEPING

☐ Yes ☐ No ☐ NA 2.1 General appearance of lab is neat and orderly

☐ Yes ☐ No ☐ NA 2.2 Aisles and exits free from obstruction

☐ Yes ☐ No ☐ NA 2.3 Work surfaces protected from obstruction

☐ Yes ☐ No ☐ NA 2.4 Spills absent

☐ Yes ☐ No ☐ NA 2.5 Electrical cords and wires in good condition

☐ Yes ☐ No ☐ NA 2.6 Tools and equipment in good repair

☐ Yes ☐ No ☐ NA 2.7 Defective glassware absent

☐ Yes ☐ No ☐ NA 2.8 Combustible materials not stored near flammables

3.0 HAZARD COMMUNICATION

☐ Yes ☐ No ☐ NA 3.1 Primary and secondary chemical containers labeled appropriately

☐ Yes ☐ No ☐ NA 3.2 Signs on storage areas (e.g., refrigerators) and lab room doors

☐ Yes ☐ No ☐ NA 3.3 MSDS complete and available

☐ Yes ☐ No ☐ NA 3.4 Chemical Hygiene Plan available

☐ Yes ☐ No ☐ NA 3.5 The front door to all labs should have signs indicating the type of hazards present in the lab. Write down all information.

4.0 PERSONAL PROTECTIVE EQUIPMENT

☐ Yes ☐ No ☐ NA 4.1 Eye protection available and used

☐ Yes ☐ No ☐ NA 4.2 Lab coats and/or lab aprons available and used appropriately

☐ Yes ☐ No ☐ NA 4.3 Gloves available, used, and matched to hazards

☐ Yes ☐ No ☐ NA 4.4 Respirators absent (unless by permission of the EH&S Office)

☐ Yes ☐ No ☐ NA 4.5 Laboratory attire is appropriate for the work being performed.

5.0 CHEMICAL STORAGE

☐ Yes ☐ No ☐ NA 5.1 Incompatible chemicals segregated

☐ Yes ☐ No ☐ NA 5.2 Current inventory of chemicals available and recent (within 1 year)

☐ Yes ☐ No ☐ NA 5.3 Hazardous chemicals not stored above 6' on open shelves

☐ Yes ☐ No ☐ NA 5.4 Bulk quantities of flammable liquids stored in approved safety cans, cabinets

☐ Yes ☐ No ☐ NA 5.5 Safety carriers available for bottles

☐ Yes ☐ No ☐ NA 5.6 Out-of-use chemicals absent (i.e. no legacy or obsolete chemicals)

☐ Yes ☐ No ☐ NA 5.7 Excessive quantities of chemicals not stored on benches

☐ Yes ☐ No ☐ NA 5.8 Lab limits for flammables not exceeded (Limit=____)

6.0 COMPRESSED GAS CYLINDERS AND VACUUM PUMPS

☐ Yes ☐ No ☐ NA 6.1 Chained, secured

☐ Yes ☐ No ☐ NA 6.2 Inspected for condition, pressure retention

☐ Yes ☐ No ☐ NA 6.3 Gas lines, piping, manifolds, etc. labeled with identity of contents. Gas ports labeled.

☐ Yes ☐ No ☐ NA 6.4 Protective caps in place except when cylinders are in use

☐ Yes ☐ No ☐ NA 6.5 Vacuum pumps appropriately ventilated. Rotovaporators wrapped in electrical tape when possible

☐ Yes ☐ No ☐ NA 6.6 Vacuum pumps enclosed with fan belt guard

☐ Yes ☐ No ☐ NA 6.7 Flammable gas lines equipped with flashback arrestors

7.0 WASTE DISPOSAL

☐ Yes ☐ No ☐ NA 7.1 Hazardous wastes not disposed in general sewer system (sink) or in general trash

☐ Yes ☐ No ☐ NA 7.2 Waste containers closed except when adding or removing waste

☐ Yes ☐ No ☐ NA 7.3 Containers for hazardous wastes in good condition

☐ Yes ☐ No ☐ NA 7.4 Containers of hazardous waste labeled with the words hazardous waste and other descriptive words

☐ Yes ☐ No ☐ NA 7.5 Is there spill containment available?

☐ Yes ☐ No ☐ NA 7.6 Satellite accumulation areas posted and orderly? Waste moved to central storage area when container is full?

☐ Yes ☐ No ☐ NA 7.7 Broken glassware in designated containers and not in general trash

☐ Yes ☐ No ☐ NA 7.8 Discarded sharps in designated containers and containers closed

☐ Yes ☐ No ☐ NA 7.9 Empty containers labeled and/or triple rinsed

8.0 LABORATORY HOODS AND VENTILATION

☐ Yes ☐ No ☐ NA 8.1 Hoods in sound working condition

☐ Yes ☐ No ☐ NA 8.2 Hoods marked with operating heights, average face velocity. Date of last check: _____

☐ Yes ☐ No ☐ NA 8.3 Gauges, monitors and alarms operating properly

☐ Yes ☐ No ☐ NA 8.4 Hoods not cluttered with chemicals, equipment

☐ Yes ☐ No ☐ NA 8.5 General ventilation adequate

9.0 SAFETY EQUIPMENT/EMERGENCY RESPONSE

☐ Yes ☐ No ☐ NA 9.1 Spill containment clean-up material available?

☐ Yes ☐ No ☐ NA 9.1.a Are kits stocked with required supplies

☐ Yes ☐ No ☐ NA 9.2 Eye wash/safety showers in sound working condition, not blocked

9.3 Fire extinguishers:

☐ Yes ☐ No ☐ NA 9.3.a Type and appropriate location, not blocked, good working order.
☐ Yes ☐ No ☐ NA 9.3.b Date of last inspection: _____
☐ Yes ☐ No ☐ NA 9.3.c All laboratories have at least one extinguisher.
☐ Yes ☐ No ☐ NA 9.3.d Locate all extinguishers in the lab, answer the following, then date and initial the back of the tag.
9.3.e Number of extinguishers in lab: _____
9.3.f Most recent inspection: _____
☐ Yes ☐ No ☐ NA 9.3.g All extinguishers labeled?
☐ Yes ☐ No ☐ NA 9.3.h All extinguishers have tags?
☐ Yes ☐ No ☐ NA 9.3.i Are any tags broken?
☐ Yes ☐ No ☐ NA 9.3.j Are all pins in place?
☐ Yes ☐ No ☐ NA 9.3.k All residue removed from nozzles?
☐ Yes ☐ No ☐ NA 9.3.l Are the extinguishers mounted on the wall?

☐ Yes ☐ No ☐ NA 9.4 First aid kit available?

☐ Yes ☐ No ☐ NA 9.4.a Are kits fully stocked with required supplies?

☐ Yes ☐ No ☐ NA 9.5 Fire blanket available as appropriate

☐ Yes ☐ No ☐ NA 9.6 Locations marked for all above items

☐ Yes ☐ No ☐ NA 9.7 All exits free and unobstructed

☐ Yes ☐ No ☐ NA 9.8 Emergency numbers posted

10.0 SINKS

☐ Yes ☐ No ☐ NA 10.1 Are the sinks free of chemical bottles?

☐ Yes ☐ No ☐ NA 10.2 Are the sinks free of debris?

11.0 TRAINING

11.1 List names of all students, lab coordinators, lab staff and faculty working in lab and ensure they have been trained according to the CHP and documentation of training is available.

☐ Yes ☐ No ☐ NA _____

☐ Yes ☐ No ☐ NA _____

☐ Yes ☐ No ☐ NA _____

☐ Yes ☐ No ☐ NA _____

☐ Yes ☐ No ☐ NA _____

☐ Yes ☐ No ☐ NA _____

APPENDIX C

CHEMICAL INVENTORY TEMPLATE

3.0

CHEMICAL INVENTORY
REVISED: _____

Chemical Name	CAS #	Supplier	Department	Building/ Room #	Hazardous Constituents	EHS (yes/no)	EHS TPQ Exceeded (yes/no)	Date Received	Quantity on Hand	Expiration Date (if applicable)	Disposal Necessary (yes/no)

APPENDIX D

INCIDENT REPORT

3.0

TEMPLE COLLEGE
INCIDENT REPORT

Date: _____ **Time:** _____

Name of Person Involved _____ **Telephone:** _____

Form Completed By: _____ **Telephone:** _____

Building: _____ **Department:** _____

ACCIDENT

- ☐ **Sickness**
- ☐ **Accident**
- ☐ **Injury**
- ☐ **Medical Attention**
- ☐ **Other** _____

ASSISTANCE REQUIRED
(*check all that apply)*

- ☐ **Police**
- ☐ **Security**
- ☐ **Ambulance**
- ☐ **Nurse**
- ☐ **Other** _____

TAKEN TO HOSPITAL

(*circle one): YES NO*

Transported by: _____

[Scott and White Memorial Hospital]

Other _____

Faculty/Staff/Students involved

_____

_____

Witnesses:

_____

_____

Description of Incident (attach additional pages as necessary)

_____

_____

_____

Root Cause (attach additional pages as necessary)

_____

_____

_____

Corrective Actions	**Owner**	**Completion Date**
1.		
2.		
3.		
4.		

Routing / Distribution

Copies of this Incident Report must be sent immediately to the following:

VP of Administration Services
Appropriate Supervisor (if incident involves staff employee)
Vice President for Student Life (if incident involves student(s))
Director of Human Resources (if incident is Worker's Compensation claim)

APPENDIX E

SECONDARY CONTAINER LABEL TEMPLATE

(to be used with Universal Laser Printer Labels, 80108)

Secondary Container Labels

Chemical Name: _____

Chemical Manufacture: _____

☐	**Heath**
☐	**Flammability**
☐	**Reactivity**
Personal Protection:	

APPENDIX F
CHEMICAL COMPATIBILITY

EPA's Chemical Compatibility Chart

EPA-600/2-80-076 April 1980

A METHOD FOR DETERMINING THE COMPATIBILITY OF CHEMICAL MIXTURES

Please Note: This chart is intended as an indication of some of the hazards that can be expected on mixing chemical wastes. Because of the differing activities of the thousands of compounds that may be encountered, it is not possible to make any chart definitive and all inclusive. It cannot be assumed to ensure compatibility of wastes because wastes are not classified as hazardous on the chart, nor do any blanks necessarily mean that the mixture cannot result in a hazard occurring. Detailed instructions as to hazards involved in handling and disposing of any given waste should be obtained from the originator of the waste.

CODE	CONSEQUENCE
H	Heat Generation
F	Fire
G	Innocuous and non-flammable gas generation
GT	Toxic Gas formation
GF	Flammable Gas formation
E	Explosion
P	Violent Polymerization
S	Solubilization of toxic substance
U	May be hazardous, but Unknown

#	REACTIVITY GROUP NAME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	101	102	103	104	105	106	107
1	Acids, Mineral, Non-oxidizing																																									
2	Acids, Mineral, Oxidizing			G																																					
3	Acids, Organic		H		H																																				
4	Alcohols and Glycols	H	F	P																																					
5	Aldehydes	H	F	P																																					
6	Amides	P	F																																						
7	Amines, Aliphatic and Aromatic	H	GT																																						
8	Azo Compounds, Diazo Compounds and Hydrazines	H	GT	H		H																																			
9	Carbamates	H	H	H	H																																				
10	Caustics	G	GT	G	G	H			G																																
11	Cyanides	H	H	H		H			H	H																															
		GT	GT	GT					G	G	10																														
		GF	GF	GF					H			11																													
12	Dithiocarbamates	H,F	H,F	H,GT		GF			H				12																												
		GF	GF	GF		GT		U	G					13																										
13	Esters	H	F						H		H				14																										
			H						G							15																									
14	Ethers	H	F														16																								
15	Fluorides, Inorganic	GT	GT	GT														17																							
			H																18																					
16	Hydrocarbons, Aromatic		F																	19																				
		H	H,F					H	H		H										20																			
17	Halogenated Organics	GT	GT					GT	G		GF	H										21																		
		H	H,F	H	H			H	H		H,P	H											22																	
18	Isocyanates	G	GT	G	P			P	G		G	G	U											23																
		H	H						H															24																
19	Ketones	F	F						G		H	H													25															
	Mercaptans and Other Organic	GT	H,F						H																	26													
20	Sulfides	GF	GT						G									H	H	H	20				S	H													
	Metals, Alkali and Alkaline Earth,	H,F	H,F	H,F	H,F	H,F	GF	GF	GF	GF	GF	GF		GF				H	GF	GF	GF					GF	27												
21	Elemental	GF	GF	GF	GF	GF	H	H	H	H	H	H	GF,H GT	H				E	H	H	H	21				H,E		28											
																							22							29									
	Metals, Other Elemental & Alloys	H,F	H,F	G					H,F		GF							H	GF		H,F																		
22	as Powders, Vapors, or Sponges	GF	GF	F					GT	U	H							E	H		GF										30									
																		H						23															
	Metals, Other Elemental & Alloys	H,F	H,F						H,F																															
23	as Sheets, Rods, Drops, etc.	GF	GF						G									F							24															
	Metals and Metal Compounds,						S	S			S															25													
24	Toxic	S	S	S																							26													
		GF	H,F	H	H,E	GF				H		GF		GF				GF		GF	GF					GF		27											
25	Nitrides	HF	E	GF	GF	H			U	G	U	H	GF H	H				H	U	H	H	E				H			28										
		H,GT	H,F								H										P			S	H				29									
26	Nitriles	GF	GT	H							U															26													
			H,F								H										H,E				H,E													
27	Nitro Compounds, Organic		GT			H					E										GF				GF		27											
	Hydrocarbons, Aliphatic,		H																				H					28										
28	Unsaturated	H	F			H																	E						29									
	Hydrocarbons, Aliphatic,		H																											30									
29	Saturated		F																												31								
	Peroxides and Hydroperoxides,	H	H		H	H		H	H,F	H,F		H,E						H		H,F	H	H		H	H,E	H,P		H				32							
30	Organic	G	E		F	G		GT	E	GT		GT	H,F GT					E	H	E	GT	E	G		G	GF	GT		P					33						
			H						H										H			GF				H									34					
31	Phenols and Cresols	H	F						G										P			H													101				
	Organophosphates,																																				102			
	Phosphothioates,	H	H								H																											103		
32	Phosphodithioates	GT	GT						U		E											H									U		32					104	
		GT	HF																											H								105	
33	Sulfides, Inorganic	GF	GF	GT		H			E										H											GT			33					106	
		H	H	H	H			H	H		H	H									H	H	H		H	H				H	H		H						
34	Epoxides	P	P	P	P	U		P	P		P	P	U								P	P	P		P	P				P	P	U	P	34					
	Combustible and Flammable	H	H,F																			H,F				H,F				H,F					101				
101	Materials, Miscellaneous	G	GT																			G				GF				GT									
		H	H	H					H		H			H								H	H	H						H	H		H	H	H				
102	Explosives	E	E	E					E		E			E								E	E	E	E	E				E	E		E	E	E	102			
		P	P	P					P		P	P										P	P	P	P	P				P	P		P				103		
103	Polymerizable Compounds	H	H	H					H		H	H	U									H	H	H	H	H				H	H		H					104	
		H		H	H	H	H,F	H,F	H	H,F		H,E		H	H		H	H	H,F	H	H,F	H,F	H,F	H		H,F	H,F	H	H	H	H	H	H,F	H,F	H,F	H,F	H	H,F		
104	Oxidizing Agents, Strong	GT		GT	F	F	GT	GT	E	GT		GT	H,F GT	F	F		F	GT	F	GT	E	E	F		E	GT	E	F	F	G	F	GT	GT	G	G	E	GT	104	
		H	H,F	H	H,F	H,F	H	H				H	H				H,F	H	H	H						H	H			H	H	H,GT				H	H	H,P	H,F	
105	Reducing Agents, Strong	GF	GT	GF	GF	GF	GF	G				GT	H F				E	E	GF	GF	GF					GF	E			E	GF	GF		H	GF	E	GF	E	105	
	Water and Mixtures Containing																		H							H							GT					GF	
106	Water	H	H						G										G			H	H		S	GF							GF					GT	106
107	Water Reactive Substances	<---EXTREMELY REACTIVE! DO NOT MIX WITH ANY CHEMICAL OR WASTE MATERIAL! EXTREMELY REACTIVE!--->																																				107
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	101	102	103	104	105	106	107

APPENDIX G

SAFETY CONCERN FORM

3.0

SAFETY CONCERN

Return completed form to Mr. Seth Vance, Chemical Safety Officer, EPA

Name *(optional)* _____

Contact e-mail (*optional*) _____

Department of concern _____

Laboratory of concern _____

Description of safety concern

_____

_____

_____

Suggested Corrective Action

_____

_____

SAFETY CONCERN

Return completed form to Mr. Seth Vance, Chemical Safety Officer, EPA

Name *(optional)* _____

Contact e-mail (*optional*) _____

Department of concern _____

Laboratory of concern _____

Description of safety concern

_____

_____

_____

Suggested Corrective Action

_____

_____

APPENDIX H

LAB PROCEDURE CHANGE FORM

3.0

LAB PROCEDURE CHANGE FORM

1. Title of Project _____

2. Project Owner Information

Project Owner _____

Department _____

Building _____ Room Number _____

Telephone _____ **Fax** _____

e-mail _____

3. Laboratory Information where project will be conducted:

Building _____ Room Number _____

Telephone _____

Laboratory contact person if other than owner

Name _____ **Title** _____

Telephone _____ **Email** _____

4. List of individuals working on this particular project (including students)

Name	Title	Chemical Hygiene Training Date

5. Brief non-technical abstract of planned work (Use other sheets if more space is needed):

_____

_____

_____

_____

_____

_____

6. Indicate applicable category of this project:

☐ **New proposal**
☐ **Addition or modification to existing proposal (Indicate additional project approval #)**
☐ **Teaching / Training**

7. List below the particularly hazardous chemicals that will be sued in connection with this project.

Chemical Name	Chemical Abstract Number (CAS)	Hazard Class (Carcinogen, Reactive, mutagen, etc)

8. What is your previous work experience wit the chemicals specified in Section 7?
(Use additional sheets if necessary):

_____

_____

_____

9. Are Material Safety Data Sheets (MSDS) available to all employees working on this project?

☐ **yes** ☐ **no** **If "no" please acquire all necessary MSDS**

CONTAINMENT AND SAFETY EQUIPMENT

10. Will a chemical fume hood be used: ☐ **yes** ☐ **no**
Indicate flow-rate and date the chemical fume hood was last tested: _____
(Chemical fume hoods require annual testing and certification)

11. Indicate Personal Protective Equipment (PPE) to be used:

Gloves (indicate type _____) Eye Protection (Indicate type _____)

Protective clothing (indicate type _____) Respiratory Protection *_____

Other (specify) _____
_____

* Note: If a respirator is used, the wearer must be examined by a health care professional to determine if the user is medically fit to wear a respirator. The CSO will choose the appropriate respirator and provide fit testing for the user.

3.0

CHEMICAL WASTE DISPOSAL AND HAZARD COMMUNICATION

12. Perform a waste determination on all waste streams resulting from this project in accordance with the Waste Management Plan. Waste Streams identified:

_____

_____

_____

13. Is current emergency contact information posted in the laboratory where this project is to be performed?

☐ **yes** ☐ **no**

14. Indicate the type of fire extinguishers required

☐ **ABC**
☐ **D**
☐ **Not applicable**

Is that type available in the lab ☐ **yes** ☐ **no**

Date fire extinguishers were last inspected _____

15. Please indicate any additional information or components pertinent to the CSO's review of this protocol:

_____

_____

_____

16. I have read and am familiar with the Chemical Hygiene Plan, Material Safety Data Sheets, safety practice, containment equipment, and laboratory facilities recommended for the chemicals used in this project. I agree that all faculty, staff and students working on this project will follow these recommendations as a condition of the Safety Committee approval of this project.

_____ _____

Date **Project Owner**

TO BE COMPLETED BY THE CSO ONLY

Date Received _____

Date Reviewed: _____

Approved ____ **Yes** ____ **No**

If no, explain: _____

If yes, assign approval #: _____

Date Returned to Project Owner: _____

CSO Name _____ _____

(print) *Signature*

APPENDIX I

CHP DOCUMENTATION (TRAINING/RECEIPT OF COPY)

3.0

Temple College Chemistry Safety Contract
Chemical Hygiene Plan Documentation

THE INTENT OF THIS AGREEMENT IS TO MAKE THE STUDENT AWARE OF HIS/HER RESPONSIBILITY FOR LABORATORY SAFETY AND RULES.

As a chemistry student at Temple College, you have certain responsibilities to know, understand and maintain during your tenure as a chemistry student involved in laboratory usage. Basic laboratory rules as well as safety rules have been presented. This contract is an agreement between you and Temple College where the student agrees to abide by these presented rules and any additional safety recommendations provided by the chemistry instructor or chemistry department. By signing this document, the student agrees to the following:

I AGREE TO:

- Conduct myself in a responsible manner at all times (no horseplay of any type) in the laboratory.
- Follow all instructions given, orally or in writing, by the instructor.
- Perform only those activities assigned and approved by the instructor.
- Protect eyes by wearing safety glasses or safety goggles at all times in the laboratory.
- Protect the body by wearing appropriate clothing (long pants; closed-toed shoes) and necessary protective clothing (aprons; lab coat; gloves) when instructed by the instructor.
- Not eat or drink, use tobacco, or chew gum in the laboratory.
- Notify the instructor immediately of an emergency.
- Never work alone in the laboratory.
- Never enter the chemical prep area or store rooms unless instructed to do so and are supervised by the instructor or chemistry department personnel.
- Know the location of safety equipment (first aid kit; eye wash; fire extinguisher, safety shower; fire blanket).
- Carry out good housekeeping practices such as: keeping work areas clean; properly cleaning up spills; properly cleaning and documenting breakage; properly disposing of chemical waste as instructed; removing all trash from work area; and wiping all work area counters upon completion of the lab session.

I ACKNOWLEDGE:

- That I have been informed of the Chemical Hygiene Plan (CHP) for Temple College. The CHP can be found at: http://www.templejc.edu/admin/admin.htm#PeerAudit.
- That I have been informed of the location and availability of the Material Safety Data Sheets (MSDS) for the laboratory.
- That I have seen the laboratory safety film.

I, _____ , (print your name) have read and agree to adhere to the safety regulations and practices set forth in this "contract" and the CHP. I understand that it is my responsibility as well as the instructor to provide and maintain a safe environment in the laboratory.

Student Signature_____Date_____

CHEM 1111._____ CHEM 1405._____ CHEM 2423._____
CHEM 1112._____ CHEM 1407/1408._____ CHEM 2425._____

APPENDIX J

29 CFR PART 1910.1450, OCCUPATIONAL EXPOSURES TO HAZARDOUS CHEMICALS IN LABORATORIES ("LAB STANDARD")

UNITED STATES
DEPARTMENT OF LABOR

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Regulations (Standards - 29 CFR) - Table of Contents

• **Part Number:**	1910
• **Part Title:**	Occupational Safety and Health Standards
• **Subpart:**	Z
• **Subpart Title:**	Toxic and Hazardous Substances
• **Standard Number:**	1910.1450
• **Title:**	Occupational exposure to hazardous chemicals in laboratories.
• **Appendix:**	A , B

1910.1450(a)

Scope and application.

1910.1450(a)(1)

This section shall apply to all employers engaged in the laboratory use of hazardous chemicals as defined below.

1910.1450(a)(2)

Where this section applies, it shall supersede, for laboratories, the requirements of all other OSHA health standards in 29 CFR part 1910, subpart Z, except as follows:

1910.1450(a)(2)(i)

For any OSHA health standard, only the requirement to limit employee exposure to the specific permissible exposure limit shall apply for laboratories, unless that particular standard states otherwise or unless the conditions of paragraph (a)(2)(iii) of this section apply.

1910.1450(a)(2)(ii)

Prohibition of eye and skin contact where specified by any OSHA health standard shall be observed.

1910.1450(a)(2)(iii)

Where the action level (or in the absence of an action level, the permissible exposure limit) is routinely exceeded for an OSHA regulated substance with exposure monitoring and medical surveillance requirements paragraphs (d) and (g)(1)(ii) of this section shall apply.

1910.1450(a)(3)

This section shall not apply to:

1910.1450(a)(3)(i)

Uses of hazardous chemicals which do not meet the definition of laboratory use, and in such cases, the employer shall comply with the relevant standard in 29 CFR part 1910, subpart Z, even if such use occurs in a laboratory.

1910.1450(a)(3)(ii)

Laboratory uses of hazardous chemicals which provide no potential for employee exposure. Examples of such conditions might include:

1910.1450(a)(3)(ii)(A)

Procedures using chemically-impregnated test media such as Dip-and-Read tests where a reagent strip is dipped into the specimen to be tested and the results are interpreted by comparing the color reaction to a color chart supplied by the manufacturer of the test strip; and

1910.1450(a)(3)(ii)(B)

Commercially prepared kits such as those used in performing pregnancy tests in which all of the reagents needed to conduct the test are contained in the kit.

1910.1450(b)

Definitions —

Action level means a concentration designated in 29 CFR part 1910 for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Carcinogen (see *select carcinogen*).

Chemical Hygiene Officer means an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. This definition is not intended to place limitations on the position description or job classification that the designated indvidual shall hold within the employer's organizational structure.

3.0

Chemical Hygiene Plan means a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that (i) are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace and (ii) meets the requirements of paragraph (e) of this section.

Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment which results in an uncontrolled release of a hazardous chemical into the workplace.

Employee means an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

Hazardous chemical means any chemical which is classified as health hazard or simple asphyxiant in accordance with the Hazard Communication Standard (§1910.1200).

Health hazard means a chemical that is classified as posing one of the following hazardous effects: Acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in appendix A of the Hazard Communication Standard (§1910.1200) and §1910.1200(c) (definition of "simple asphyxiant").

Laboratory means a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory scale means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

Laboratory-type hood means a device located in a laboratory, enclosure on five sides with a moveable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.

Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.

Laboratory use of hazardous chemicals means handling or use of such chemicals in which all of the following conditions are met:

(i) Chemical manipulations are carried out on a "laboratory scale;"

(ii) Multiple chemical procedures or chemicals are used;

(iii) The procedures involved are not part of a production process, nor in any way simulate a production process; and

(iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Medical consultation means a consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

Mutagen means chemicals that cause permanent changes in the amount or structure of the genetic material in a cell. Chemicals classified as mutagens in accordance with the Hazard Communication Standard (§1910.1200) shall be considered mutagens for purposes of this section.

Physical hazard means a chemical that is classified as posing one of the following hazardous effects: Explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid, or gas); self reactive; pyrophoric (gas, liquid

or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; in contact with water emits flammable gas; or combustible dust. The criteria for determining whether a chemical is classified as a physical hazard are in appendix B of the Hazard Communication Standard (§1910.1200) and §1910.1200(c) (definitions of "combustible dust" and "pyrophoric gas").

Protective laboratory practices and equipment means those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Reproductive toxins mean chemicals that affect the reproductive capabilities including adverse effects on sexual function and fertility in adult males and females, as well as adverse effects on the development of the offspring. Chemicals classified as reproductive toxins in accordance with the Hazard Communication Standard (§1910.1200) shall be considered reproductive toxins for purposes of this section.

Select carcinogen means any substance which meets one of the following criteria:

(i) It is regulated by OSHA as a carcinogen; or

(ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or

(iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (latest editions); or

(iv) It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:

(A) After inhalation exposure of 6–7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m^3;

(B) After repeated skin application of less than 300 (mg/kg of body weight) per week; or

(C) After oral dosages of less than 50 mg/kg of body weight per day.

1910.1450(c)

Permissible exposure limits. For laboratory uses of OSHA regulated substances, the employer shall assure that laboratory employees' exposures to such substances do not exceed the permissible exposure limits specified in 29 CFR part 1910, subpart Z.

1910.1450(d)

Employee exposure determination --

1910.1450(d)(1)

Initial monitoring. The employer shall measure the employee's exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL).

1910.1450(d)(2)

Periodic monitoring. If the initial monitoring prescribed by paragraph (d)(1) of this section discloses employee exposure over the action level (or in the absence of an action level, the PEL), the employer shall immediately comply with the exposure monitoring provisions of the relevant standard.

1910.1450(d)(3)

Termination of monitoring. Monitoring may be terminated in accordance with the relevant standard.

1910.1450(d)(4)

Employee notification of monitoring results. The employer shall, within 15 working days after the receipt of any monitoring results, notify the employee of these results in writing either individually or by posting results in an appropriate location that is accessible to employees.

1910.1450(e)

Chemical hygiene plan -- General. (Appendix A of this section is non-mandatory but provides guidance to assist employers in the development of the Chemical Hygiene Plan).

1910.1450(e)(1)

Where hazardous chemicals as defined by this standard are used in the workplace, the employer shall develop and carry out the provisions of a written Chemical Hygiene Plan which is:

1910.1450(e)(1)(i)

Capable of protecting employees from health hazards associated with hazardous chemicals in that laboratory and

1910.1450(e)(1)(ii)

Capable of keeping exposures below the limits specified in paragraph (c) of this section.

1910.1450(e)(2)

The Chemical Hygiene Plan shall be readily available to employees, employee representatives and, upon request, to the Assistant Secretary.

1910.1450(e)(3)

The Chemical Hygiene Plan shall include each of the following elements and shall indicate specific measures that the employer will take to ensure laboratory employee protection;

1910.1450(e)(3)(i)

Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals;

1910.1450(e)(3)(ii)

Criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices; particular attention shall be given to the selection of control measures for chemicals that are known to be extremely hazardous;

1910.1450(e)(3)(iii)

A requirement that fume hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment;

1910.1450(e)(3)(iv)

Provisions for employee information and training as prescribed in paragraph (f) of this section;

1910.1450(e)(3)(v)

The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from the employer or the employer's designee before implementation;

1910.1450(e)(3)(vi)

Provisions for medical consultation and medical examinations in accordance with paragraph (g) of this section;

1910.1450(e)(3)(vii)

Designation of personnel responsible for implementation of the Chemical Hygiene Plan including the assignment of a Chemical Hygiene Officer, and, if appropriate, establishment of a Chemical Hygiene Committee; and

1910.1450(e)(3)(viii)

Provisions for additional employee protection for work with particularly hazardous substances. These include "select carcinogens," reproductive toxins and substances which have a high degree of acute toxicity. Specific consideration shall be given to the following provisions which shall be included where appropriate:

1910.1450(e)(3)(viii)(A)

Establishment of a designated area;

1910.1450(e)(3)(viii)(B)

Use of containment devices such as fume hoods or glove boxes;

1910.1450(e)(3)(viii)(C)

Procedures for safe removal of contaminated waste; and

1910.1450(e)(3)(viii)(D)

Decontamination procedures.

1910.1450(e)(4)

The employer shall review and evaluate the effectiveness of the Chemical Hygiene Plan at least annually and update it as necessary.

1910.1450(f)

Employee information and training.

1910.1450(f)(1)

The employer shall provide employees with information and training to ensure that they are apprised of the hazards of chemicals present in their work area.

1910.1450(f)(2)

Such information shall be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. The frequency of refresher information and training shall be determined by the employer.

1910.1450(f)(3)

3.0

Information. Employees shall be informed of:

1910.1450(f)(3)(i)

The contents of this standard and its appendices which shall be made available to employees;

1910.1450(f)(3)(ii)

the location and availability of the employer's Chemical Hygiene Plan;

1910.1450(f)(3)(iii)

The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard;

1910.1450(f)(3)(iv)

Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory; and

1910.1450(f)(3)(v)

The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, safety data sheets received from the chemical supplier.

1910.1450(f)(4)

Training.

1910.1450(f)(4)(i)

Employee training shall include:

1910.1450(f)(4)(i)(A)

Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

1910.1450(f)(4)(i)(B)

The physical and health hazards of chemicals in the work area; and

1910.1450(f)(4)(i)(C)

The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

1910.1450(f)(4)(ii)

The employee shall be trained on the applicable details of the employer's written Chemical Hygiene Plan.

1910.1450(g)

Medical consultation and medical examinations.

3.0

1910.1450(g)(1)

The employer shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

1910.1450(g)(1)(i)

Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.

1910.1450(g)(1)(ii)

Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.

1910.1450(g)(1)(iii)

Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.

1910.1450(g)(2)

All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.

1910.1450(g)(3)

Information provided to the physician. The employer shall provide the following information to the physician:

1910.1450(g)(3)(i)

The identity of the hazardous chemical(s) to which the employee may have been exposed;

1910.1450(g)(3)(ii)

A description of the conditions under which the exposure occurred including quantitative exposure data, if available; and

1910.1450(g)(3)(iii)

A description of the signs and symptoms of exposure that the employee is experiencing, if any.

1910.1450(g)(4)

Physician's written opinion.

1910.1450(g)(4)(i)

For examination or consultation required under this standard, the employer shall obtain a written opinion from the examining physician which shall include the following:

1910.1450(g)(4)(i)(A)

Any recommendation for further medical follow-up;

1910.1450(g)(4)(i)(B)

The results of the medical examination and any associated tests;

1910.1450(g)(4)(i)(C)

Any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous workplace; and

1910.1450(g)(4)(i)(D)

A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

1910.1450(g)(4)(ii)

The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure.

1910.1450(h)

Hazard identification.

1910.1450(h)(1)

With respect to labels and safety data sheets:

1910.1450(h)(1)(i)

Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.

1910.1450(h)(1)(ii)

Employers shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees.

1910.1450(h)(2)

The following provisions shall apply to chemical substances developed in the laboratory:

1910.1450(h)(2)(i)

If the composition of the chemical substance which is produced exclusively for the laboratory's use is known, the employer shall determine if it is a hazardous chemical as defined in paragraph (b) of this section. If the chemical is determined to be hazardous, the employer shall provide appropriate training as required under paragraph (f) of this section.

1910.1450(h)(2)(ii)

If the chemical produced is a byproduct whose composition is not known, the employer shall assume that the substance is hazardous and shall implement paragraph (e) of this section.

1910.1450(h)(2)(iii)

If the chemical substance is produced for another user outside of the laboratory, the employer shall comply with

the Hazard Communication Standard (29 CFR 1910.1200) including the requirements for preparation of safety data sheets and labeling.

1910.1450(i)

Use of respirators. Where the use of respirators is necessary to maintain exposure below permissible exposure limits, the employer shall provide, at no cost to the employee, the proper respiratory equipment. Respirators shall be selected and used in accordance with the requirements of 29 CFR 1910.134.

1910.1450(j)

Recordkeeping.

1910.1450(j)(1)

The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.

1910.1450(j)(2)

The employer shall assure that such records are kept, transferred, and made available in accordance with 29 CFR 1910.1020.

1910.1450(k)

[Reserved]

1910.1450(l)

Appendices. The information contained in the appendices is not intended, by itself, to create any additional obligations not otherwise imposed or to detract from any existing obligation.

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Next Standard (1910.1450 App A)

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